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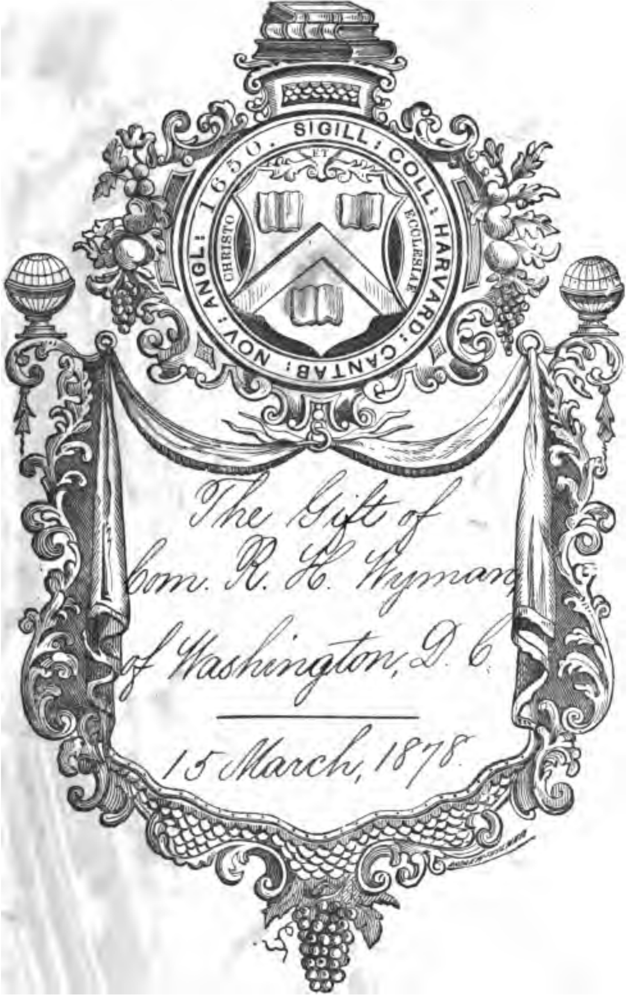
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THE

NORTHWEST AND WEST COAST OF SPAIN

AND

THE COAST OF PORTUGAL,

FROM

POINT ESTACA TO CAPE TRAFALGAR.

COMPILED AT THE

UNITED STATES HYDROGRAPHIC OFFICE,

BY

Lieut. GEORGE M. TOTTEN,
UNITED STATES NAVY.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1874.

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John R. W. Wyman,
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Washington D.C.

ADVERTISEMENT.

The N. W., W., and S. coasts of Spain and Portugal, containing a detail description of the coast from point Estaca to cape Trafalgar, has been compiled from the *Derrotero de las Costas de España y de Portugal*, by Don Pedro Rindavets y Turdury; the *Routier des Côtes N. O., Ouest et Sud d'Espagne*, and the *Description des Côtes du Royaume de Portugal*, by Captain A. Le Gras, of the French Navy; the Sailing Directions, West Coast of France, Spain, and Portugal, by Staff Commander James Penn, R. N.; together with the most recent charts and notices published Extracts have been taken from the *American Encyclopædia*, the *Encyclopædia Britannica*, *Bates's Illustrated Travels*, and the *British Commercial Dictionary.*

R. H. W.

U. S. Hydrographic Office,
Washington, D. C., February 7, 1874.

NOTE.

The bearings, courses, and trend of the land are true, unless otherwise mentioned.

The direction of the winds, as given, is the point from which they blow, and of the currents the point toward which they set.

Distances are given in geographical miles, and a cable-length as 100 fathoms.

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CHAPTER I.

WINDS, CURRENTS, TIDES, FOGS, ETC.

The N. W., W., and S. coasts of Spain and the coast of Portugal described in this work extend from point Estaca on the N. to cape Trafalgar on the S. The first part of the Spanish coast described comprises the provinces of Coruña and Pontevedra, whose shore-line is indented with deep bays in which many good and well-sheltered harbors are found. The second part comprises the provinces of Huelva and Cadiz, the coast of which is broken by the vast bay of Cadiz.

Winds. The action of the polar and tropical winds is constant on the west coast of the Iberian peninsula, the N. W. and S. W. winds being only a deviation of these, while the N. E. and S. E. winds may be considered as land breezes of short duration. During two-thirds of the year the wind blows from the northward, ranging between N. E. and N. W.; fresh and with clear weather during the summer, but with gloomy weather and rain in winter. The polar winds prevail from April to October, and the equatorial for the rest of the year: thus, from November to March, the prevailing winds are from S. to W., ending always between W. and N. When these westerly winds (*vents d'aval*) blow in the dry season, they are never very strong and last but a short time.

Winds from S. and S. S. E. are frequent from December to March; they blow about 24 hours, then turn to rain, shift suddenly to S. W., blow longer from this quarter, and then terminate at W. or W. N. W., from which points the cross-winds blow.

Winter. The wet season on this coast commences in November and ends in February. During the winter months heavy rains fall which are brought up by the violent S. W. winds. The *vents d'aval* or *vendavales*, so called by the sailors of the peninsula, are the storms from S. S. W. to W. S. W. They are generally heralded by heavy squalls from the S., preceded by isolated clouds moving with more or less speed according to the strength of the wind which will follow.

Signs of the vendaval

In clear weather, if small fleecy clouds (cirro-cumulus) appear and cover the sky, forming what is known to seamen as *mackerel-sky*, the *vendaval* may be expected, especially in winter; before 24 hours have passed, the sky will be completely overcast and the S. wind established. If the wind commences with force it will blow from this quarter for 24 hours, with frequent showers, when it will shift to S. W., hold there for 2 or 3 days, hauling finally to W., and as far as N. W., always blowing heavily with a less cloudy sky.

Those delicate cobweb threads that are sometimes seen on the rigging are another sign of westerly winds. These indications are only seen in clear and calm weather. When they appear in winter, wind may be looked for from the South, increasing rapidly to a gale, and accompanied by rain-squalls. In summer they precede foggy weather and winds from S. to E. and from S. to W., which bring damp weather.

There are some years when, during the winter, the wind oscillates between N. W. and S. W., accompanied by almost continuous showers, and blowing more or less heavily; it is interrupted occasionally by short intervals of clear weather when the wind veers from N. W. to N. and N. E., when it steadies and blows clear, only to shift again to S. W. when the bad weather recommences.

Backing of the wind.

When the *vendaval* lulls and the showers cease without the wind holding at N. E. the wind may be expected to back round to S. W.; and during this backing of the wind, the weather is always worse than before. In order to be able to count on the weather, the wind must have followed its normal course terminating at N. W., shifting from there to N. N. E. or N. E., holding there for several days.

In winter the N. E. winds may bring clouds and occasional showers of snow or hail, but they are generally clear. When those that blow in summer are strong, they veil the land, and the fog that accompanies them is so thick that the coast cannot be made out more than 12 or 15 miles.

At the end of the rainy season the earth saturated with moisture repels the *vendaval*, and vessels caught in bad weather out at sea, seeking the entrance of a harbor, are buffeted about by the S. or S. E. winds as they near the land without being able to reach it.

Winds from S. to E. are very rare, and when they do blow in winter are very severe and are accompanied by heavy snow-storms; the east wind is always the coldest.

Northers.

The north winds vary from N. N. E. to N. N. W., and are the prevailing winds on the west coast of the peninsula; they blow from May to September, interrupted only by the *vendavales*, with almost constant fair weather.

The *vendavales* of this season are always of short duration, and are generally accompanied by fogs, which disappear only when the wind hauls past N. W. to steady at N.; and the thicker the fog the shorter is the probable duration of the wind.

Although the north winds, with clear weather, blow almost constantly along this coast in summer, sometimes, and especially on the coast of Galicia, squalls and whirlwinds are experienced, produced by the meeting of opposing winds. These whirlwinds chiefly take place when there is an east wind from the land, while the wind at sea is S. W., and as the clouds accumulated by the latter along the coast are repelled by the east wind, storms occur.

Sometimes these storms form almost instantaneously, accompanied by loud claps of thunder and heavy rain-squalls; in this case it is prudent to furl all sail, for the wind blows with great violence during the storm. They are more frequent in August and September after a very warm summer.

In fine weather the land breezes blow regularly in the large bays of the W. coast, commencing usually about midnight and lasting until toward noon. In the season of the N. E. winds they must be profited by to leave port, vessels weighing about midnight so as to be outside before the N. E. wind is established, because it veers gradually by the N. to N. W. In tacking so as to be under the land toward midnight, and farthest out at sea when the wind hauls to N. W., vessels can easily work to the N. during the season of north winds; but when the N. E. or N. W. winds are strong and lasting, it is better to take shelter in some port.

Currents.

The frequency of N. W., W., and S. W. winds in the Atlantic raises an enormous swell, and causes a considerable current setting E. or toward the coast. When this current strikes the N. W. projection of the Iberian peninsula it separates into two branches; the northern, which flows E.

along the N. coast of Spain, then N. along the W. coast of France, is felt 30 or 40 miles at sea and is 15 or 20 miles wide; it enlarges as it goes N., and is probably augmented by the waters of the large rivers of the French coast. On the parallel of lat. 48° 20′ N., it is nearly 80 miles wide, and its direction is about N. W.; it passes 15 or 20 miles W. of Ushant and crosses the entrance of the British Channel; its velocity is estimated at ½ to 1 mile per hour, but both its velocity and direction are affected by the winds.

The other branch, called the Portuguese current, turns gradually to S. E. and to S., and flows along the Portuguese coast to cape Saint Vincent, where it bends to the E. toward the strait of Gibraltar. This southerly current is never permanent close under the land, for there very perceptible currents set from N. to S. and from S. to N., according to the prevailing winds; farther out their direction is S. E. with the wind from N. to W., and N. E. with the wind from S. to W., the former being more frequent in summer, and the latter in winter; their velocity is estimated at a little more than 2 miles when the *vendavales* are strong; so that with strong winds from seaward the current always sets toward the coast, and must be taken account of by vessels sailing along the land.

In winter, and with heavy weather from N. W. and N., the Portuguese current is a serious obstacle to sailing-vessels bound for Coruña, Ferrol, or the bay of Biscay, when trying to double cape Toriñana. When to windward of cape Villano, under such circumstances, it is recommended not to strive against wind and sea, but to bear up and take shelter in the harbor of Muros if the vessel be large, or in Camariñas if she be small. In any case it cannot be too strongly recommended to vessels from ports in the North sea or bay of Biscay bound for ports S. of cape Finisterre or in the Mediterranean, and *vice versa*, in crossing the bay of Biscay to watch carefully the wind blowing or expected, to take careful account of the currents setting in to or out of the bay, especially those setting in, and in winter or threatening weather, to keep well clear of the entire N. W. promontory of Spain; above all, if there be the slightest appearance of wind from seaward; they may thus avoid the annoyance and anxiety entailed upon them should they be drifted near this dangerous coast by the united strength of the sea and currents.

Should it be necessary to lay to under cape Finisterre during a *vendaval*, great care is necessary not to let the vessel go to leeward, for it is easy to be insensibly drifted past cape Prior.

Warning currents.

It has been observed on the coast of Galicia that one or two days before a gale the current sets toward that point of the horizon whence the bad weather will come; that is, when the current sets S. without apparent cause it preludes a gale from seaward, and the case is similar when the current sets N. The fishermen, who make constant use of the currents in sailing about, can even tell by their direction whether the wind will blow from N. E. or S. W.

Tides.

The tides preserve their usual regularity on the coasts now under discussion, only there is what is called by the pilots an *increase of water* when the wind is S. W.; that is, when the S. W. wind is strong it accumulates a great mass of water in the bay of Cadiz; each high tide mounts beyond the level attained under ordinary circumstances and the hour of the establishment of the port is retarded. The same occurrence takes place on the coasts of Galicia and Portugal, and the retardation of the hour of full tide and the commencement of ebb is proportionally greater with the distance traveled N.

Tidal-wave.

The tidal-wave which moves from S. to N. in the Atlantic naturally arrives sooner in the bay of Cadiz than on the coasts of Portugal and Galicia. This motion of the waters gives birth to a current called the *tidal current*, which follows the contour of the African coast from S. W. to N. E., nearly; in the bay of Cadiz it sets from S. to N., inclining to N. W., with the trend of the coast, then sets W. along the coast of Algarve, until it doubles cape St. Vincent, and takes a northerly direction following the outline of the peninsula. This describes the movement of the flood; in the ebb the reverse takes place.

The tidal current rarely extends far off-shore except at high water. The ordinary currents do not disturb the regular movements of the tide; they simply augment or decrease its velocity when they are favorable, or the reverse. In ordinary weather the velocity of the tidal current is estimated at 1 mile per hour during spring floods on these coasts, but this is increased to 3 and 4 miles in the channels according to their form and size. It is the same during the ebb.

Along all the coast of the bay of Cadiz the establishment is 1h. 30m., but as the tidal wave is disturbed in entering the bays, harbors, &c., the establishments of these are successively retarded; thus, while at the entrance of the bay of Cadiz the establishment is 1h. 34m.; in the Carraca channel it is 2h. 30m.; at Chipiona, 1h. 34m.; at Bonanza, 2h.; on the bar of Huelva, 1h. 54m.; and at the mole of Huelva, 2h., &c.

Along the coasts of Portugal and Galicia the hour of high spring-tide is still later; thus at Cascaes the establishment is 1h. 40m. p. m., and 2h. at Lisbon; it is 2h. 30m. at the mouth of the Douro at Oporto; 3h. at cape Finisterre; 3h. at the Sisargas islands, and 3h. 30m. at Coruña.

The greatest rise in the bay of Cadiz is 11 to 12 feet on an average at ordinary spring-tides, 12½ to 13½ on the coasts of Portugal and Galicia. At the spring-tides of the equinoxes, however, this rise is increased from 2½ to 3½ feet, if no atmospheric perturbation exist.

It is well known that the highest tide does not coincide with the full and change of the moon, but is from 36 to 48 hours later; consequently vessels making a harbor where the bar has but little water on it, should remember the fact that the greatest depth on the bar corresponds to the second or third day after the new or full moon.

Highest tides. When a high spring-tide occurs about the time of the vernal equinox, and at the same time a strong westerly wind is blowing, the waters rise so high in the harbors that the wharves are covered, the low-land flooded, and much damage is done. At Cadiz they not only cover the moles, but wash the walls of the city. In such cases the current of the flood attains a great velocity, and the hour of the establishment of the port is retarded.

Tide-rip. Outside of cape St. Vincent, and about 3 miles from its extremity, there is seen at long intervals an eddy or tide-rip which has been taken for a bank, doubtless on account of its rare occurrence. It is probably caused by the meeting of the general current of the coast of Portugal and the tidal current of the bay of Cadiz. Similar tide-rips are sometimes seen off the coast of Galicia, and may be a cause of anxiety to strangers on account of their likeness to banks. These latter rips are probably occasioned by the meeting of tidal currents passing out of the rivers with the general coast current.

Ground-swell.

A ground-swell is sometimes felt on the coast of Cadiz, especially in winter; a heavy swell from S. W. which first becomes perceptible from the noise it makes in breaking on the reefs. These howling (*criardes*) waves prelude the *vendaval* which is blowing at sea, and are often rapidly followed by it into the bay, bringing with it clouds so dense and charged with water that the land is hidden while it is flooded.

This ground-swell is almost always the forerunner of the wind which causes it, though sometimes the latter, repelled by another and more powerful current of air, does not reach the points where the swell is observed, but the height and direction of the wave show the nature of the weather prevailing at the spot where it originated, as the motion of the clouds shows the direction of upper currents of the atmosphere.

On the coast of the bay of Cadiz this ground-swell is a certain sign of the *vendaval*, and sometimes it precedes the wind one or two days. On the coasts of Portugal and Galicia, whether it come S. W., W., or N. W., it always shows that bad weather is prevailing or has just prevailed at sea, and its presence is usually a herald of the wind which causes and follows it.

In winter on the western coast of the Spanish peninsula, a heavy sea from N. W. is very common and sometimes attains colossal proportions, and also in the bay of Biscay. The waves are mountain-shaped, with a large base; are from 52 to 63 feet high, and possess a mechanical strength sufficient to crush the stoutest ships. Sailing-vessels when near a lee shore in this sea are almost always wrecked unless they happen to catch a favorable breeze that will take them off shore.

Barometer.

The fall of the barometer precedes rain on the coasts of Spain, and indicates warm southerly winds, which, becoming charged with moisture in traversing the sea, bring rain upon the coasts. But there is no indication as to whether the wind will be from S. to E., or from S. to W., or whether the rain will be light or heavy. The rise of the barometer indicates wind from N. or N. E.

A slow rise or fall of the barometer for two or three successive days gives more certain indications; and sudden variations always announce wind or foul weather.

When the barometer rises, a lowering of the level of the waters is almost always observable; this is quite perceptible in the ports, where the high tides do not attain their normal height, and the hours at which they ought to occur are advanced. The contrary takes place when the barometer falls. Thus, the seamen of the ports, fishermen, and even people unfamiliar with the sea, can predict, by this change of level, the approach of southerly or northerly winds.

The level of the waters is lower than usual in calm weather, during the prevalence of northerly winds and cold ; and the reverse during the prevalence of southerly winds and heat.

The barometric oscillations observed on the coast of Cadiz and its environs are very slight. The greatest variation observed in 15 years at the tower of Tarifa was not more than 0.91 inch; it was highest in January, 1858, with light northerly winds and clear weather; and lowest in November, 1858, with a S. W. gale and rain.

From observations made at the observatory of San Fernando from January 1, 1864, to July 31, 1865, the total barometric oscillation was found to be 1.02 inches. The greatest height reached was 30.55 inches in February, 1864, with very light airs from E. N. E., the thermometer standing at 37° F. The lowest reading was 29.53 inches in March of the same year during a gale from the S. with rain, the thermometer standing at 54° F.

Thermometer.

The motion of the thermometer is usually the opposite to that of the barometer, one rising as the other falls. A high barometer and low thermometer always indicate northerly winds; low barometer and high thermometer southerly winds.

Thermometric variations also are very slight in the bay of Cadiz, and this equable temperature along its coast is the best proof of its fine climate. Situated in a very temperate latitude, and far from any snow-covered mountains, the changes of climate are very slight; the sky is generally clear and rains are not very frequent. This coast is not much exposed to heavy storms, only once in awhile the levanters strike it.

This is not the case on the coasts of Portugal and Galicia, where it rains for a great part of the year, because, on these latter coasts is discharged the moisture collected by the N. W. and S. W. winds in traversing the Atlantic. So also the barometric oscillations are greater on these coasts than in the bay of Cadiz.

Fogs. The coasts of Galicia and Portugal are frequently visited by fogs, especially at the mouth of the rivers; they are most frequent in warm and moist winters. In the bay of Cadiz they last often for a long time, particularly near the western entrance of the strait. They form here after an east wind, spread like a curtain, close the entrance and advance little by little to the eastward, until everything is completely obscured; and they are only dissipated when the west wind is firmly established. The fog, which is formed in the morning at the mouths of the rivers on the coasts of Portugal and Galicia, always disappears about noon.

A haze very like the fog, though never so thick, forms often in warm weather, and is quite frequent on the coasts of Portugal and Galicia, with fresh N. E. winds.

Haze. In the bay of Cadiz during the summer, particularly with light S. winds, there is a thick haze about the horizon which produces a refraction like the reflection of objects in a mirror; it changes in a most remarkable manner the form of vessels and of buildings near the shore; the most projecting points appearing to be suspended over the water. The thick haze usually precedes calm and damp weather, but it sometimes precedes wind from the E. tending to the S.

During dry winters haze and fog are often so thick as to hide even the nearest objects.

Storm-clouds or squalls thicker even than the fogs are quite frequent during this season with the *vendavas* These squalls are encountered along the entire coast treated of in this work.

Vessels making the land under such circumstances are often much perplexed to find their position, because it is impossible to distinguish the high-land of the interior; and that near the sea-shore is so changed in appearance, that it is easy to mistake white towers and buildings for the sails of a ship, and where the coast is lined with scattered reefs and shoals, if their position be not marked by breakers, a vessel is in great danger of striking.

Directions: From N. to S.

A vessel leaving the channel and bound for a port on the W. coast of Spain or the strait of Gibraltar with a favorable wind, ought at first to get well to the westward, because the prevailing winds are usually more or less from that quarter. It is usual, therefore, to steer W. S. W., after leaving the channel, to reach a good position for doubling Ushant, should the wind become contrary; but should it continue favorable the astronomical observations will show if the vessel has felt the influence of tide or current, and the necessary modifications of the course; and the course should be frequently checked and corrected by observations to reach the parallel of the N. coast of Spain far enough to the westward to have nothing to fear from the proximity of the coast.

In leaving the channel, if the wind be contrary and the weather threatening it is more prudent not to attempt to struggle against the gales which may succeed one another at the entrance of the channel, but to take shelter in some port from which it is easy to put to sea at the first favorable opportunity, and thus avoid a great deal of useless wear and tear to the ship.

But, if a vessel be so far out as to render it unadvisable to run back for an anchorage, she may take the most favorable tack—that nearest the course, but must be especially careful not to get embayed in the bay of Biscay.

It is better indeed to reach to the west, until in 12° or 14° W., even if a little distance be lost by it, rather than run the risk of drifting into the bay of Biscay, because during the S. W. gales the wind often hauls to N. W., and allows a vessel, if much westing has already been made, to make a good course with a free wind on the other tack. It is on the starboard tack that a vessel is most exposed to the action of the currents setting into the bay, and they must be carefully watched. When the wind has hauled to N. W., observations can generally be made and the course checked and altered to counterbalance the effect of the current.

In working against a gale from S. or S. E., the vessel would, of course, be driven somewhat to the westward, and should try to make all the southing possible, by taking advantage of every favorable circumstance, without being driven so far to the westward as to lose the N. wind which prevails on the Portuguese coast. On the other hand, if there has been a series of westerly gales, and the vessel has been driven into the bay of Biscay, it will be found very difficult to double cape Finisterre or even cape Ortegal; under these circumstances a vessel should make every endeavor to enter the harbor of Ferrol, Coruña, Basquero, or Vivero, the two latter being 10 or 15 miles E. of the latter cape. At the worst, if a vessel lose masts or sails she will have under her lee the harbors of the French coast from Brest to Gironde, and an anchorage under Belle Isle, Pertuis Breton, &c., safe and easy of access.

After doubling cape Finisterre steer to pass to westward of the Burlings and Farilhões, the latter lying 205 miles S. of the cape and 10 miles N. W. of the peninsula of Peniche. In summer the navigation is easy, this being the season of northerly winds, when vessels can sail along the coast without risk; but it is not so in winter, the season of the *vendavales,* with constant fogs and storms. Under these circumstances, when a vessel has to work against the wind and a heavy sea, it is better to keep well out to avoid the current setting N. along the coast, as well as to be in a position to profit by every shift of wind to W. or N. W. Being near the coast in heavy weather a vessel might seek shelter in one of the ports, though on the Portuguese coast there are but few harbors, and all have dangerous bars.

With fresh N. W. winds, which are cross-winds, the same care should be exercised in regard to the course, steering more to the W. than the trend of the coast, because the currents set on shore. Happily the winds from this quarter are not as foul as those from the S. W., and though they bring up heavy wind and rain squalls, there are clear intervals which allow the land to be seen and the ship's position established.

To recapitulate, it is better to make the southing at a considerable distance from the coast of Portugal, because the west winds drive on shore and because gales are frequent during the winter, and blow with great violence and for several days at a time. If this latter course be adopted it is well to sight cape St. Vincent, and then steer for cape Spartel. After doubling cape St. Vincent and as distance is made to S. E. careful account should be taken of the weather the wind, and, above all, of the current which sets toward the strait.

From South to North. Vessels from Cadiz or the strait of Gibraltar, bound for the coast of Portugal or Galicia, or for the British Channel, will sight cape St. Vincent, so as to double it at a proper distance. It is safe to approach the cape very closely. In nearing it with strong S. W. winds it is well to keep a little away from it so as to double it easily; and if bound for the harbor of Vigo, the bay of Biscay, or the Channel, a course must be taken considerably farther to the W. than the trend of the coast, as with these winds the currents set toward the land. In thick weather there is some danger of being drifted on shore when believing the vessel to be out of all danger.

In going to Lisbon, capes Espichel and Roca will show the position of the river during the day, and the lights on them by night; but in going to Oporto during the *vendavales*, and with a thick fog, it is not prudent to near the land till clearer weather for the adjoining shores are low, and the high lands of the interior difficult to distinguish. It is very perplexing unless a vessel be placed on the parallel of the port with certainty, and steer along it until the entrance of the Douro be seen.

Going to Vigo, or any other harbor of that part of the coast, the land may be made between the mouth of the Miño and cape Silleiro, care being taken in thick weather not to run past the port, as the current sets N. with a velocity which it is difficult to determine. After sighting the Cies islands, which are high and remarkable, vessels may steer directly for the harbor of Vigo, or keep on for any more northern port.

Vessels making Coruña or Ferrol in a *vendaval* should be very careful not to pass the port, as the lost distance would be very hard to regain against the wind. When the S. W. wind is accompanied by a thick fog the whole coast of Galicia is hidden, and must be approached very closely to recognize it. In this case it is well to make the land at capes Finisterre, Toriñana, or Villano, and then sail along the coast at a convenient distance without losing sight of it until the desired port is reached. When the vessel is believed to be off cape Finisterre, and the land is so obscured that it cannot be recognized, the more prudent course is to stand off under enough sail not to sag to leeward and wait until the weather clears enough to make out the land. It sometimes happens that the breakers at the water's edge can be seen when it is impossible to make out the contour of the land or the most remarkable points, or even the lights at night. In this case, if there be any doubt as to the ship's position, it is better to stand to sea.

Vessels bound for the bay of Biscay, the Channel, or ports of the North sea, having bad weather from the westward and fog, should keep far enough out to be in a good position and pass well clear of cape Finisterre in doubling it.

In the season of N. E. winds, which blow all summer with few interruptions, particularly in the years of the *Northers*, so called by seamen, it is quite difficult to get north, and sailing-vessels are cited which took one and two months on the passage from cape St. Vincent to Ferrol.

With steady and continuous northerly winds, which vary, as a rule, between N. N. E. and N. N. W., it is better in a good ship to keep well out to evade the strength of the current, which is always greater near the land; sometimes the wind is thus found nearer N. W., so that a good tack can be made to N. E. Under these circumstances small vessels and coasters seek shelter under the lee of the capes, &c., keeping out of the inhabited ports to avoid increasing their daily expenses by the payment of port-dues.

If a vessel works well and the captain is familiar with the coast, much may be gained by taking advantage of the slightest change of wind; vessels should near the land in the evening so as to be very close to when the wind shifts to N. E., and take the tack to seaward in the morning, tacking again at noon when the wind is nearest W., so that a good stretch can be made toward the land. If working thus, it happen that the tidal currents be favorable when the vessel is under the land, the voyage may be more rapidly made than if the ship had kept well out through fear of the land without profiting by the favorable changes at night, or those which might occur at sea.

Steamers, as a rule, follow the coast, keeping off a little in bad weather from seaward, but keeping the land in sight so as to note the successive points and have the position well determined; they pass inside the Burlings day and night unless the fog be so thick as to completely hide them

CHAPTER II.

FROM POINT ESTACA TO CORUÑA.

Variation 21° 30′ *to* 21° 50′ *westerly in* 1871, *decreasing about* 7′ *annually.*

Point Estaca.

Point Estaca, the northern extremity of the Spanish peninsula, is the western extreme of the rocky promontory which terminates 1½ miles farther to the eastward in cape Vares. This latter cape is formed by a conical hill 694 feet high, sloping down to the water, and to which the name of Monte del Cabo has been given. Point Estaca extends toward the N. W., and, narrowing as it advances into the sea, terminates in pointed weather-worn rocks.

Moiños point.

The coast between these two points is bluff and inaccessible, and the sea breaks upon it very heavily. Half-way between them is Moiños point, rugged and broken, with some small rocks extending quite a distance outside of it. Vessels should, therefore, give this bluff a good berth at night or in thick weather.

Cape Vares.

Cape Vares may, however, be approached in good weather as near as is desired, as it is steep-to. With strong breezes from S. S. W. to W. S. W., this neighborhood is subject to violent squalls and gusts.

Los Siguelos.

Two conical rocky islets lie a short distance off point Estaca. They are called Los Siguelos, the outer and smaller of the two being still further distinguished by the name of Estaquin.

Estaquin.

Just outside of Estaquin are two rocks just awash, and from here the water deepens gradually to seaward, there being 14 fathoms 1 cable outside of Estaquin and 22 fathoms with rocky bottom 2 cables farther out. With a N. W. wind this vicinity should be avoided, as then the sea breaks heavily at a distance outside of Estaca point.

Light: Lat. 43° 47′ 20″ N., long. 7° 44′ W.

From a light-tower on a hill about ½ a mile S. E. ½ S. of Estaquin, a *white revolving* light is exhibited, attaining its greatest brilliancy once every minute, and visible 23 miles in good weather. The light-keeper's dwelling adjoins the tower, which is 35 feet high. The focal plane of the light is 306 feet above the level of the sea.

The coast between point Estaca and cape Prior is rocky, bluff, and inaccessible, particularly between cape Ortegal and Cedeiro, and with N. and N. W. winds it is dangerous to approach in winter.

Winds in winter.

N. W. winds are most frequent on this part of the coast in winter, and cause the heaviest sea. They last sometimes for 15 days, or even longer, and are frequently accompanied by violent squalls of wind and rain. Winds from S. S. W. and S. W., called *vendavales*, bring thick weather, and are frequently followed by a severe northwester. N. E. winds are not as frequent as in summer, but blow hard, with rain, when they do occur. South winds almost always blow freshly with clear weather, and last frequently for a week. As soon, however, as cloudy weather supervenes, the *vendaval* or S. W. wind may be expected, which is again followed by wind from N. W.

A heavy N. W. swell is frequently the forerunner of a strong gale from that quarter.

Winds in summer.

In summer, or rather from June to October, N. E. winds prevail, with generally good weather and smooth sea. N. W. winds, when they occur, are gentle and do not last long.

Currents.

The *vendaval* is rare, especially in June. In fine weather the only currents off this shore are those produced by the tides, the flood running from N. E. to E. and the ebb from S. W. to W.

Well off shore, at a distance which has never been exactly defined, a constant N. E. current is felt, sometimes strong enough to check the ebb-tide. With a fresh N. E. wind the strength of this current increases, and its effect is felt closer inshore. Westerly currents are seldom or never felt.

The coast between Estaca point and cape Prior should not be approached nearer than 7 miles, to avoid the heavy sea in rough weather and to prevent being becalmed in fine weather.

From Estaca point to Bandeja point the coast trends S. W. by W. for 5 miles, and is formed of steep whitish bluffs with small beaches between them. Near Bandeja point the land is mountainous, gradually sloping toward point Estaca.

Piedras Meas rocks.

From the rocky extremity of Bandeja point a reef covered by from 3½ to 13 fathoms of water extends 2 miles off shore to the Piedras Meas, two rocks lying awash at this distance N. N. W. from the point. In heavy weather the sea breaks all the way across the channel inside of them. It should therefore only be used in fine weather. In passing inside these rocks they should be kept close aboard; in passing outside give them a berth of ¼ of a mile.

Bay of San Antonio. S. W. of Bandeja point is a small bay ½ a mile wide, called the Concha de San Antonio, the western limit of which is a high rocky point surmounted by a watch-tower.

Espasante bay and village. Between this headland and Carnero or Espasante point, 1 mile to the westward, is Espasante bay, with a small village of the same name on its shore. The bay, although spacious, affords no shelter, and is not at all frequented.

Espasante point is the extreme of a long tongue of land separating Espasante bay from a shallow bay 1½ miles wide but nearly dry at low water.

Seijo point. W. N. W. 2 miles from the Piedras Meas is Seijo, or San Julian point, the extremity of a steep triangular bluff, called the Fronton de Gargacido. Off this point at a short distance is a steep rugged islet called Marbeira, having a narrow channel between it and the shore 100 yards wide, with a depth of 5 fathoms. **Marbeira islet.**

Between Marbeira Islet and the Piedras Meas is the entrance to the narrow estuary called Cariño inlet. From a line drawn across the mouth, the coast forms a bight about 5 miles deep, with two arms extending east and west.

The largest of these is the eastern one, on which the town of Santa Marta de Ortigueira is situated.

Cariño inlet. Cariño inlet is navigable in mid-channel as far as Fraile and Carnero points, having from 18 to 20 fathoms at the entrance, but only 4 fathoms near the bar between these two points. It is not at all a safe place during the winter months.

A little more than 1 mile south of Seijo point is Cariño point, flat and rocky, and which has shallow water for some distance off it. The bay between has a steep shore, clear of danger, with Gabeira islet lying so close to it as not to afford passage for boats. **Gabeiro islet.**

Near Cariño point are the ruins of an old fortification. This point is the northern limit of Cariño bay, about 8 cables wide and 1½ deep. In the middle of the bay there is a depth of 3 to 4 fathoms, sandy bottom, the water gradually shoaling toward the beach, on which is situated the town of Cariño, having a population of about 1,600 inhabitants. The southern limit of Cariño bay is point Castro de Moura, and just to the southward of it is Monteran or Mentaron point, off which are two flat rocks, which are generally out of water. Inside of them is a boat-channel, and between them a passage with from 4 to 5 fathoms. The outside one is steep-to, and may be passed close to in 7 fathoms, sandy bottom. Cariño.

From Monteran the coast, of moderate height but backed by high land, continues to Fraile point, which may be known by a small conical islet just off it. About 1 mile farther to the eastward is the islet of San Vicente, commonly called La Insua, large, rounded, and covered with trees and bushes. Between this islet and Carnero point is a passage for boats at high water.

The bar of port Santa Marta has two channels, one near the island of San Vicente and the other near Fraile point. The former has the deepest water, but the latter is better, because straighter and more easily navigated. Within the bar is a large sand-bank, dry in places at low water. Off Sismondi are deep places, with from 5 to 9 fathoms, affording anchorage. Port Santa Marta.

As these channels are changed by gales of wind, a pilot should always be taken. Vessels bound to Santa Marta generally anchor off Cariño point, to wait for a pilot or for a chance to cross the bar. The village of Sismondi has about 200 inhabitants and stands on a hill about ½ a mile inland. Farther in is the harbor of Santa Marta, 3 miles long and 2 miles wide, but much obstructed by sand-banks. It is the best and most sheltered anchorage on this part of the coast for small vessels. Vessels can carry 9 feet at neap tides and 11 feet at springs up to the town, which lies on the north side of the harbor and has about 1,000 inhabitants. Good water and provisions may be obtained. Nothing is exported from here, and salt is almost the only import.

It is high water, full and change, at 3h. at Santa Marta and 2h. 30m. at Sismondi. Spring tides rise 11 feet and neaps 9 feet, but the height of the water is much affected by the wind. Tides.

Cape Aguillones, lying W. ¾ S. 7 miles from point Estaca, is known to the coasters as cape Ortegal, and the promontory Coast.

which is commonly known by that name is called the Alto de Lima.

Cape Aguillones is formed of steep broken rocks terminating in sharp peaks which rise to a considerable height. On the N. W. side it is black, steep, and inaccessible, but not so much so when seen from the S. E. From this cape a chain of rocky islets extends N. E. by N., also steep and broken, rising almost vertically from the sea. The most distant from shore, which lies 1 mile from the cape, is called Caballo Juan; the next one inshore is surmounted by three sharp peaks, and is called Tres Hermanos; the next and largest of the chain is called Insua Mayor; the fourth, shaped like a pyramid, is El Rodicio, and the nearest one to the cape is named La Longa. Outside of these islets at a short distance is a sunken rock called La Rocemada, on which the sea always breaks. There are passages between these islets and inside of them for small vessels, in which the least water is 10 fathoms, rocky bottom. N. E. of these rocks and 1 mile distant from them will be found depths of 30 and 35 fathoms, coarse shells. The N. E. face of cape Aguillones forms a triangular bluff ½ a mile long. The coast between cape Aguillones and cape Ortegal, (the Alto de Limo of the local mariners,) which lies 1½ miles W. ¾ S., is high, steep and inaccessible. The sea is heavier and the currents are stronger here than in any other part of this coast, and sailing-vessels should therefore give it a wide berth.

Cape Ortegal is a high, steep, and rounded promontory easily recognized when seen from the N. W., by the table lands rising gradually one above another to the summit, on which is the Limo watch-tower, 940 feet above the sea-level

From the foot of the cape a tongue of low land projects, called Limo point, surrounded by sunken rocks to the distance of ½ a cable, on which the sea always breaks. A dangerous shoal, called Leé bank, lies about ½ a mile north o Limo point. On this shoal there are 2½ fathoms at high water, and in the channel between it and the shore there are 13 to 16 fathoms.

On making the land from the northward the point is not easily distinguished, being backed by higher land. It may be known, however, when on this bearing by a steep, black, triangular bluff close to it.

Seen from the N. E. the cape appears rounded and the terraced table-lands are then apparent.

Two miles off shore there are 40 fathoms of water, with a bottom of sand and shells, the depth gradually diminishing toward the shore. Strong N. E. winds are here often preceded by a strong easterly current.

During pleasant weather the land between cape Ortegal and Cedeiro may be coasted at the distance of 1 mile, but when bad weather is expected or during the winter season it would be prudent to give it a berth of 5 or 6 miles at least.

S. W. of cape Ortegal, at a distance of 2½ miles, is Cuadro point, formed by steep, sharp bluffs rising from the sea and sloping upward to the Capelado mountain, on one of the eminences of which is a watch-tower 2,080 feet above the sea. A small islet, steep-to with a flat top, lies at some distance from the point.

Candelaria point, 4½ miles S. W. by W. ½ W. from Cuadro point, is black and steep, sloping from a conical mountain abruptly to the sea. It may be recognized by its rocky broken peaks, which diminish in size toward the water's edge. A reef with two rocks above water extends from the point toward the N. W. These two rocks, when seen from a distance, look like two fishing-boats. It is frequently desirable to get hold of Candelaria point to be sure of avoiding the dangers off port Cedeiro, and to that end these rocks are a good landmark. The watch-tower of Candelaria stands on a neighboring mountain of considerable height, but it is difficult to distinguish, owing to its dark color and ruined condition.

Gabeiras islets.

Between Cuadro and Candelaria points the coast forms a bight about 1½ miles deep. The whole of this coast is rocky and steep. At the head of this bight and close in-shore are some high rocky islets, called the Gabeiras. One and a half miles to the westward of these islets is Domingo point, with a detached rock lying close to it.

Two miles S. S. W. of point Candelaria is Faucino point, steep, rugged, and salient, with some detached rocks lying at its base. All this coast to the entrance of port Cedeiro is mountainous and steep.

A short distance to the southward of Faucino point is

Port Cedeiro. point Eigil,* steep-to, black, and rugged, which with Chirlateira or Pantin point, 1½ miles S. W. by S. from it, form the entrance to port Cedeiro.

This harbor is small, and can only be of advantage to vessels of 11 to 14 feet draught, as it is shallow in the most sheltered anchorage. Vessels of larger draught must lie farther out, and are consequently more exposed to the sea.

From Eigil point the coast trends to the southward, forming slight indentations, separated by Escalciroa and Toilido points, for 1¾ miles to Sarridal point. A short distance off shore, between Escalciroa and Toilido points, is Escalciroa island and the Blancas rocks, both steep-to and clear of hidden danger.

Cedeiro. From Sarridal point a small bight makes to the eastward, on the north shore of which is the little town of Cedeiro, of about 800 inhabitants. The town faces N. E., and cannot therefore be seen from the usual anchorage. The town lies at the foot of Monte Eigil, 820 feet high, and can only be reached from seaward at high water, as the harbor is nearly filled up in its eastern part by a large flat, which is dry at low tide. A stream empties in front of the town, only large enough to admit small coasters and fishing boats, which lie aground at low water. The town is surrounded by high mountains. On the south side of the harbor is a sand-beach nearly ½ a mile long, in front of which is the best anchorage. The beach is called the Playa de Loira, and at each end of it a small stream empties. These little rivers are navigable at high water by small coasters.

Immediately to the westward of the Playa de Loira is Monte Borneira, a conical hill, 535 feet high, with a small watch-tower near its summit. From here the coast, steep and rocky, trends about N. N. W. for a little more than 1 mile to Chirlateira or Pantin point.

Light: Lat. 43° 39′ N., long. 8° 05′ W. From Rebaleira point, at the eastern end of the sand-beach just mentioned, a *fixed white* light is exhibited from a tower at a height of 89 feet above the level of the sea. It can only be seen from seaward by bringing the mouth of the port open.

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* The British admiralty chart (Port Cedeiro, No. 78) has a doubtful shoal, marked 2¾ fathoms, about ¼ of a mile N. W. by W. from point Eigil, but the authority for it is not known.

Dangers off Chirlateira point.

A chain of rocks, some sunken and some above water, extend from Chirlateira point for nearly 1 mile to the N. W., which should be carefully avoided by vessels approaching or leaving the harbor. Of these rocks the closest to the point are two called El Sarnoso and El Meixon. The latter and outer one lies 1 cable outside the other, with a passage between them for boats in good weather.

A dangerous sunken rock, called La Laxe, lies N. E. by N. 1 cable from El Meixon. This rock is smooth and flat, with less than 2 fathoms of water on it, which breaks with the least sea. Between this rock and El Meixon there are from 13 to 15 fathoms of water.

A little less than 2 cables W. by N. ½ N. from La Laxe is the equally dangerous rock called Nieto shoal, also with 2 fathoms of water on it, and having in the channel between it and La Laxe 13 to 15 fathoms.

Another rocky shoal, called El Peton, lies 5½ cables W. N. W. of La Laxe. It has 7½ fathoms on it, and only breaks in heavy weather. There are 25 fathoms of water a short distance outside of it.

Inshore 1 cable from the Nieto rock is the Badaxeira shoal, with 5 fathoms on it, and 1 cable farther to the S. E. is still another, called the Pauxallo, with only 1½ fathoms at low water. When the sea gets up this is the first of these shoals to break.

Medio-mar rocks.

The Medio-mar (half-tide) rocks lie nearly in the middle of the harbor, half way between Sarridal point and the opposite shore, at the foot of Monte Borneira. They are three rocky hummocks, which always break and are uncovered at low water.

The entrance to the port is easily recognized at a distance by Monte Borneira, by the chapel of San Antonio half way up a hill on the eastern shore, and by Monte Eigil on the eastern shore overlooking the town.

Anchorage.

A vessel from the westward should keep at least 2 miles from Chirlateira point till the entrance is well open and the whole of the white sand of the Playa de Loira can be seen. Then steer for Sarridal point till within ¼ of a mile of it, when steer to pass half way between it and the Medio-mar rocks, and anchor in 2½ fathoms, with fort Conception in line with Chirlateira point.

Tides.

It is high water, full and change, at port Cedeiro at 3 h. Springs rise 11 feet and neaps 9 feet. The rise during N. W.

gales is 4 feet more than during those from the eastward. The greatest velocity of the stream is 1 mile per hour.

Coast. From Chirlateira point the coast continues for 2½ miles to the westward to Prados point, high, black, and steep, sloping down from the mountain of the same name. Between these two points the coast is high and steep, forming small bays separated by slightly salient points. The largest and easternmost of these bays is Pantin bay, with the village of the same name a short distance inland.

To the westward of Prados point is the beach of Trouxeira, extending 2 miles S. W., terminated there by the point of the same name, low and round, with some detached rocks lying off it.

This beach is clear of danger, and the crew of a ship driven toward it might be saved by running the vessel ashore here. For this purpose the western end would be the best, as it is more shelving. This beach is conspicuous from a distance from its whiteness.

S. E. of Trouxeira point is the lake of the same name, with a channel leading to the sea at the eastern end of the beach. The lake is quite shallow, and the channel leading to it will only permit fishing-boats to pass.

The coast to the westward of Trouxeira point is not very high, but has high land back of it. The sea breaks heavily on this coast and on the banks near it. Vessels should therefore keep 8 or 9 miles off shore while passing it with winds between north and west.

From Trouxeira point the coast as far to the westward as Monte Campelo, which slopes down to the sea, forms small bays. Of these only Portonovo bay affords any shelter. Coasters anchor here in summer with fresh N. E. winds, but with any prospect of a N. W. wind it would be a very dangerous anchorage.

A depth of 5½ fathoms is found, with sandy bottom. The entrance is at the foot of the eastern slope of mount Campelo. This hill is high, and looks like a saddle from the N. W., but from the N. E. it appears conical. The eastern point of the entrance is steep and looks like an islet. It may be recognized by a conical rock near it. The village of Portonovo is a short distance inland.

From Monte Campelo to cape Prior the coast is steep and of moderate height for a short distance, after which comes

Cape Prior.

Cobos bay, with an extensive beach, called the Arenal de Cobos, at its head. Cape Prior is the western extremity of a high rocky peninsula, extending to the N. W. and forming on that face a steep bluff 1½ miles long, running N. E. by E. and S. W. by W.

The beach of Santa Comba or Cobos to the eastward and San Jorge beach to the westward of the cape, both low and only separated by a narrow neck of land, give to the cape the appearance of a saddle-shaped island when seen from N. E. or S. W.

From the N. W. it is not so easily distinguished, being backed by high land, but then is readily recognized by the sharp peaks of its summit.

Light: Lat. 43° 33′ 40″ N., long. 8° 19′ 09″ W.

Half way down the slope of the cape and on a bluff extending to the N. W. is a light-tower rising from the center of a square white building. From the tower, at a height of 446 feet above the sea, a *fixed white* light is exhibited, visible at a distance of 15 miles.

Cabalo reef.

A chain of rocks and shoals called the Cabalo reef extends ½ a mile from the N. E. end of cape Prior bluff. The rocks above water are small, except one, which is flat-topped and high. The shoals break with the least sea and are easily seen.

Bermeo bank.

The Bermeo bank is a rocky shoal lying 7 miles N. 25° E. from cape Prior and 3½ miles N. W. from Trouxeira point. It is rather more than 1 mile long E. and W., and rather less from N. to S. It is exceedingly steep-to, the depth on approaching it on any side changing suddenly from 40 to 16 fathoms. It is generally considered that from 9 to 12 fathoms is the least depth, but the positions of these shoal spots have not been established. As breakers have been seen on the bank with S. W. winds, it is possible that there may be spots of even less depth.

N. N. W. of the Bermeo bank, distant 1 mile, there is a smaller bank, on which the least depth is 20 fathoms. The exact position of this bank has not been established, although both the banks constantly serve as fishing-grounds for the fishermen of Cedeiro and Mugardos.

The currents off cape Prior generally depend upon the prevailing wind, a N. E. wind producing a S. W. current, and *vice versa.* With a fresh N. W. wind and rough sea, a good offing should be kept, as the current then sets strongly on shore. With fine weather, however, a vessel may coast along inshore and avail herself of the tides.

Fogs are quite frequent on this coast, especially during the autumn season, and are the usual forerunners of the *vendaval* or S. W. wind. Heavy rollers from the N. W. also occur sometimes during a calm. They are considered as indicating wind from that quarter and precede its coming sometimes 24 hours.

The winds for each season are the same as those described for the vicinity of point Estaca on p. 23.

Coast. From cape Prior the coast trends S. E. by S. for a short distance to Cela point, rugged and rocky, which forms the northern limit of the bay and beach of San Jorge, (also called Do-Rios.) This bay is bounded to the southward by the low and steep point called Erbosa, and is 1½ miles wide and about 1 mile deep. Temporary shelter may be obtained here, with winds from N. E. to S. E., but great care must be taken not to get caught here with on-shore winds.

One mile S. by W. ¼ W. from Erbosa point is point Levadizo, off the western side of which, about ¼ of a mile distant, are two dark-colored barren rocky islets, called the Gabeiras, connected by a reef, over which boats may pass at high water. Inshore of them is a narrow channel through which small vessels may pass in case of necessity. From the Gabeiras a rocky bank with from 9 to 18 fathoms extends to the N W. From its outer end Candelaira point is just open of cape Prior.

Between point Levadizo and Serantes point, 1½ miles S. by W., is the extensive beach of Doniños. Off this beach, with winds from S. E. to N. E., temporary anchorage may be had in from 7½ to 11 fathoms, fine sandy bottom. Near the center of this beach is the lagoon and village of Doniños. The lagoon is 39 feet deep and has no visible communication with the sea.

Serantes point is rocky and salient. A little more than 1 mile to the S. E. of it is cape Prioriño Grande.

Monte Ventoso, at the south end of Doniños beach and close to the sea, is an excellent landmark, being easily recognized by its isolated position and its signal-tower on top, from which arriving and departing vessels are signaled.

Cape Prioriño. From Monte Ventoso a tongue of land juts out to the S. W., and, as it somewhat resembles cape Prior, has been called cape Prioriño. The western extremity of this tongue is called cape Prioriño Grande; the southern extremity is cape Prioriño Chico, and forms the northern point of the entrance to the harbor of Ferrol. It is rugged, dark-colored, and rocky, and may be approached within 1 cable by vessels of any size.

Light: Lat. 43° 27′ 50″ N., long. 8° 20′ W.

About half way up the southern face of cape Prioriño Chico is a quadrangular building, with a light-tower rising from its center. From this tower is exhibited a *fixed white* light, varied every two minutes by a *red flash*. The light is 89 feet above the level of the sea, and in clear weather can be seen 12 miles.

The light can be seen when approaching from the northward as soon as cape Prioriño Grande is rounded, and from the westward as far as the narrows leading into Ferrol harbor.

Cape Prioriño Grande resembles Prioriño Chico, and is about the same height, but more bluff. From it a small reef extends to the south about 100 yards. The coast between the two capes is rocky, with many detached fragments lying along the shore.

Ferrol harbor.

From cape Prioriño Chico to Peñaboa point, rather more than 6 miles to the S. W. of it, the coast forms a deep bight divided by three salient peninsulas into Ferrol harbor, Ares, and Betanzos inlets, Coruña bay, and Orson bay. Of these ports Ferrol is by far the best, as it is sheltered from all winds, being inclosed by high land on all sides.

To the eastward of the two outer points of entrance to the harbor, cape Prioriño Chico and Coitelada point, 1¼ miles apart, the two shores incline toward each other for nearly 3 miles, the channel narrowing to 2 cables in width, and then suddenly widening into an excellent and spacious harbor, capable of sheltering a fleet of large vessels, beside many smaller ones, in its convenient coves and indentations. Its fine situation at the N. W. angle of the peninsula, its great capacity, its convenient depth, (from 6 to 9 fathoms,) and particularly its excellent dock-yards and arsenal, make it one of the most convenient and valuable of the Spanish military ports.

Cariño bay.

Cariño bay, on the northern shore of the entrance to Ferrol harbor, and immediately to the westward of cape Prioriño Chico, 1⅕ miles wide, ¾ of a mile deep, with depths of 9 to 11 fathoms, over sandy bottom. This anchorage is much used by vessels bound into Ferrol with N. E. or S. E. winds, to wait either for daylight or a fair tide. The coast of the bay is clear of danger. The anchorage is sheltered from N. W. and N. E. winds, and is reasonably secure with either wind, as the holding-ground is good, and southerly winds do not raise much sea. The best berth is 2 cables south of the sandy beach, at the head of the bay, in 7½ to 13 fathoms; but if bound to Ferrol a vessel had better lie a little farther out, keeping open the entrance to that harbor.

The eastern limit of Cariño bay is San Carlos point, rugged, steep-to, and formed by the slope of San Cristoval mountain, back of it. Here the channel is 3 cables wide, and commences to narrow.

Entrance to Ferrol.

From San Carlos point to San Felipe castle, ¾ of a mile to the eastward, the shore is clear of danger, but from the castle a reef with 14 feet of water on it extends ¼ of a cable to the southward. To the eastward of San Felipe the coast sweeps round to the northward, forming the little bay of Lensada, the western limit of which is Bispon point, which, with Redonda point on the south side, form the inner points of entrance.

Muela rock.

On the south side of the entrance both Coitelada and Segaño points are moderately high and rugged. Between them is the little cove of Chanteiro, with a sandy beach at the head of it. On the western side of point Segaño is a battery, and on its summit a station for repeating the signals made from Monte Ventoso. Besides the rocks along the shore of point Segaño, most of which are out of water, there is one, the Muela, with 6 feet of water on it, 100 yards off the north side of the point. This rock is about 20 yards in extent, and, in addition to the weeds which show its position, it is marked by a red buoy.

The marks for it are Bispon point, on with the N. W. angle of the barracks at Ferrol, (a large square edifice seen in the direction of the channel,) and the western extremity of point Coitelada, on with Segaño point. To clear it, bring Bispon point, just shut in with San Cristoval point, the next one west of San Felipe castle; this will lead north of the rock in 5½ fathoms of water, which is as near as any vessel should approach it. The same point on with the southwest angle of the barracks leads clear in 7½ fathoms.

Batel bank.

Six cables E. of La Muela rock, and close to the southern shore, is the Batel bank, usually awash, but which at low-water spring-tides is 1 foot out of water. From its shoalest spot the southern angle of San Carlos castle bears N. 6° 40′ E., and the flag-staff on point Segaño S. 77° 20′ W.

Cabaliño and Cabala rocks.

A little farther E., close to the southern shore and about 70 yards apart, are two rocks, the western called Cabaliño, just awash, and the Cabala, with three rocky heads, 8 feet high at low water. From these rocks to Palma castle (nearly 1 mile) the shore is clear of danger, but a small reef projects in a N. W. direction for 70 yards from Palma castle, and from point Redonda, 2½ cables E. N. E. of the latter, another small reef juts out for 70 yards in a N. by E. direction, with from 6 to 14 feet upon it. This reef is marked by a buoy.

Reefs on southern shore.

The general depth in the channel is from 7½ to 9 fathoms of water, over sand, gravel, and shells, with a few holes having 12 to 14 fathoms. A vessel may anchor anywhere where the lead shows sandy or gravelly bottom, taking care not to approach the south shore too closely, as the bottom is rocky there.

Lights: Lat. 43° 27′ 45″ N.; long. 8° 16′ 08″ W.

At a point about 100 yards east of Palma castle, on the south shore, and nearly 3 miles east of cape Prioriño Chico, a *fixed red* light is shown, which is visible 8 miles. The light is shown at a height of 38 feet above the level of the sea, from a light-colored granite tower.

Lat. 43° 28′ 40′ N.; long. 8° 14 31″ W.

A *fixed white* light, elevated 23 feet, is also exhibited from the end of the mercantile mole at Ferrol, and is visible 4 or 5 miles.

Anchorage.

From Bispon point on the north and Redonda point on the south the harbor of Ferrol opens out with an anchorage space of 2½ miles long and ¾ of a mile wide, besides an arm of the harbor at the eastern end, called Jubia bay, into which the river of the same name empties.

The best and most sheltered part of the port is on the north shore, between the towns of Ferrol and La Graña. This bight is called Serantes bay, from the river of that name which empties into it. In its center will be found from 7 to 9 fathoms of water, with a good holding-ground of sand and mud.

Small vessels haul close in to La Graña to obtain more perfect shelter, and merchant vessels lie close to the wharves at Ferrol. The water in this bight is shoaling constantly, while that in Jubia bay is deepening.

At La Graña are ship-yards, where building and repairs are constantly going on.

Ferrol The city of Ferrol is divided into two parts, the old and the new, and, with the suburb of Esteiro, contains nearly 20,000 inhabitants. The old town occupies the summit and southern slope of a small hill 260 feet high, and the modern part extends S. W. and N. E. along the foot of this hill. It is surrounded by a strongly fortified wall. On the south side of and lying parallel to the new town is the spacious basin, with an opening to the south. It is surrounded by workshops and store-houses, and on its eastern side are twelve building-slips. Between the dock-yard and the new town is the part of the town called Esteiro and the barracks, a large building, forming a good leading mark for vessels entering the harbor.

Ferrol has abundance of water and excellent provisions. All sorts of supplies for steamers and sailing-vessels can also be obtained.

To the eastward of the town of Ferrol, the shores of the harbor gradually approach each other, forming Jubia bay. Jubia river is navigable a short distance for boats.

Seixo and Mugardos. On the south shore of the harbor are the village of Seixo and the town of Mugardos. The latter place lies about ½ a mile east of Redonda point, and has a population of about 2,200, most of whom are engaged in fishing.

Shoal. Between the town of Seixo and the entrance to the basin is a shoal spot, with 5 fathoms of water, over rocky bottom. From the entrance to the basin this patch bears S. S. E. distant 4 cables.

An anchorage may be chosen as convenient. Pilots are always ready to go out on a signal being made for one. In heavy weather a pilot will wait and board a vessel inside of Segaño point.

It is not prudent to approach Ferrol at night with S. W. winds and thick weather, as the lights cannot then be easily seen and the currents are strong, but at any other time there is no difficulty.

Tides. It is high water, full and change, at Ferrol harbor at 3h. Spring-tides rise 13 feet, neaps 9½ feet. With S. W. winds and at the equinoxes the tides rise 1 or 2 feet higher. The stream at spring-tides runs 2½ miles an hour and 1 mile at neaps, but in the narrow parts of the channel it is much stronger. The flood-tide sets strongly on point Segaño.

Winds. In the vicinity of Ferrol, as well as along the adjoining coast, the prevailing winds are during the summer from N. E., and in the winter season from S. W.

The N. E. wind in summer is attended with clear weather, and frequently blows for 15 days at a time, being then only interrupted by S. W. or W. winds of short duration. Winds from the N. E. in winter are accompanied by thick, rainy weather. Vessels are sheltered completely from these winds wherever in Ferrol inlet they may be lying. They generally breeze up about 10 a. m. and die away toward evening.

All the winds between S. and W., known on this coast as *vendavales*, are to be guarded against by seeking a protected berth and having good ground-tackle ready. They blow heavily in winter, with thick weather and violent squalls. In summer also they bring thick weather, making it difficult or impossible to distinguish landmarks.

N. W. and W. winds bring clear weather, and, although they blow with considerable force and roll in a heavy sea, are welcomed by the coasters, thereby enabling them to make a harbor.

Winds from the south are most disliked and feared, as, in addition to their bringing thick and heavy weather, they throw vessels to leeward of their ports and prevent their beating up to them.

Ares and Betanzos inlets. Ares and Betanzos inlets, formed by two arms of the deep bight between the harbors of Coruña and Ferrol, have water enough to afford anchorage to the largest vessels; but being open to the W. and N. W., they are only used by such small vessels as can find shelter under the slightly projecting points of the shore.

The Miranda bank and islands on the north side, and the Serron de la Torrella reef on the south side, however, break the sea somewhat, and should a vessel be off the entrance to this bight with N. W. or W. winds, and find herself unable to get into Ferrol or Coruña, she may stand in here and anchor as soon as she is to the eastward of the Miranda bank, secure against dragging, however hard it may blow, if a good anchor is let go and 100 fathoms of chain veered to it.

The points of entrance are Coitelada point on the north and Seixo Blanco point on the south shore, 3¼ miles apart.

Seixo Blanco point. Seixo Blanco point is high, steep, and clear of danger, with a nearly vertical, crooked white stripe on it, which seen from a distance appears like a road.

Dexo point. Rather more than 1 mile E. N. E. from Seixo Blanco point is Dexo or Deixo point, steep and of moderate height, with some detached rocks lying at its foot. Lying about 1 cable off the point is a small islet, called Corbal or Marobiña, steep-to, of moderate height, and having a passage between it and the shore for boats. N. W. by W. ½ W. from Dexo point, distant about 4 cables, is Marola islet, moderately high and steep, with a small rugged rock lying a short distance to the N. W. of it. Between these islets and the land is a passage with 6 to 7 fathoms of water, rocky bottom.

Torrella point. From Dexo point the coast, rugged and broken, trends E. ½ N. for ¾ of a mile to Torrella point, having several detached rocks at its foot. A reef called the Serron de la Torrella extends about 4 cables from the point in a N. E. direction, having from 3 to 14 fathoms of water on it, and to which a good berth must be given with a sea rolling in from N. W., as it is then covered with breakers. This reef is marked by a buoy.

From Torrella point the coast trends to the S. E., forming a bay limited to the eastward by San Amade point, distant from Torrella point nearly 2 miles S. E. ¾ E. All this shore is steep and rocky, except two small beaches at the head of the bay.

Betanzos inlet. Two miles to the eastward of San Amade point is point Carboeira,* and between them is the entrance to Betanzos inlet extending 4 miles to the S. S. E. Its depth gradually diminishes from 7 fathoms, muddy bottom, at the entrance, to 1 fathom, which depth is found abreast of the point and castle of Curbeiroa. From here upward it is all dry at low water spring-tides, except the channels into the rivers and brooks, which empty into the head of the inlet.

From San Amade point the coast, steep and moderately high, extends in a S. E. direction for 1⅔ miles to Fontán point, crowned by a ruined castle and with the little village of the same name lying immediately to the southward of it. Two hundred yards eastward of the point is the little islet of Carcabeiro, surrounded by detached rocks, one of which, 100 yards to the S. E., called Do Porto, has 6 feet of water on it, and is marked by a buoy. Another rock, called the Pulgueiro, dry at low water, lies about 2 cables farther to the southward. Both these rocks lie about 1 cable off shore. To the E. and E. N. E. of Fontán castle is a well-sheltered anchorage, with winds between S. and W., with from 3 to 6 fathoms of water over sandy bottom. Small vessels that can lie close in under the point can find shelter even with N. W. winds.

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* On Admiralty Chart No. 79, (inlets of Ferrol, Coruña, and Betanzos) this point is called Curbeiroa.

One mile S. by E. from Fontán point is point Curbeiroa, with another ruined castle, and close to it the little village of Sada, with about 1,200 inhabitants.

Coasters only can approach the town of Sada, as the sandbanks extend a long way out, and the anchorage is constantly shoaling. From Curbeiroa point and castle the shore trends to the S. E. and then N. E. and N., forming several small coves, into the most southerly of which the rivers Mandeo and Mendo empty. Four miles from their mouth is the town of Betanzos, containing nearly 6,000 inhabitants, and situated on a hill, the base of which is washed by these two rivers. On the eastern shore, opposite Fontán point, is Bañobre bay, a shallow bight into which the river of the same name empties.

Carboeira point, separating Ares and Betanzos inlets, is rugged and of moderate height, with an islet of the same name lying close to it.

Ares inlet.

From here the coast takes a general N. N. E. direction for 1½ miles to Lensada point, forming several small indentations, in one of which is a small sand-beach. Lensada point, with point Redes ¾ of a mile to the N. N. E., form the entrance to Redes bay. On Redes point is a ruined castle, and the little village of the same name lies close to the northward of it.

Redes bay extends about 1 mile farther to the eastward, its shores presenting nothing particularly worthy of remark. The bay has an average depth of 2½ fathoms. At the head of the bay is the mouth of the river Eume, with the town of Puente de Eume, containing nearly 2,000 inhabitants, and overlooked by mount Breamo a short distance to the southward. This elevation, 968 feet high, and surmounted by a chapel, affords a good landmark.

The anchorage of Redes has a good muddy holding-ground, and, although open to the S. W., is the best in the inlet of Ares. Three-quarters of a mile W. by S. from Redes point is an islet called Mouron or Camoca, 65 feet high, flat-topped, and covered with vegetation. It is so close to the shore and is so similar in appearance that it is with difficulty distinguished. At high tide boats can with difficulty pass inside of it. On the south and west sides of this islet it is steep-to and clear of danger, but there are some rocks and shoals reaching off from it about 1 cable to the eastward.

Between this islet and Ares point, nearly 1 mile to the westward, is the entrance to Ares bay. Ares point is rugged and broken, sloping down to the water's edge and surmounted by a ruined fort and barracks 90 feet above the sea-level. From the point a reef stretches off, so that a berth of 1 or 2 cables should be given it in hauling round. Ares bay would be an excellent anchorage but for the sandbanks, which nearly fill it up. The shore of the bay is formed by sandy beaches with two salient points, Raso and Peña Ciscada, near which are some isolated rocks. Between these two points, on the opposite side of the bay from the town is Raso beach.

Vessels of moderate draught anchor in line with the castle and guard-house in 14 to 15 feet of water, with a bottom of sandy mud, 2 cables from the point. Those of larger draughts lie farther out, in 4 to 4½ fathoms, on the same bearing. Small coasters lie close in to the town. In standing into the bay give Cruz de Paella point, S. W. of the castle, a berth of 2 cables.

Tides.

It is high-water, full and change, at Ares at 2h. 30m. Springs rise 12 feet, but the rise is affected by the winds to the extent of 1 or 2 feet either way.

Miranda point, islands, and bank.

Three-quarters of a mile to the westward of Ares point and castle is Miranda point, low and rocky, and from which a reef extends, visible at low water.

A group of low, rocky islets, called the Mirandas, lies about ⅓ of a mile off the point. The outer one, the largest, is flat-topped, nearly circular, and about 45 feet high; the next one, called Mirandita, is of a conical form. The rest are barren rocks, frequented by sea-birds.

The Miranda bank is a dangerous reef, lying about ½ a mile S. W. of the largest islet, and extending 4 to 5 cables in a N. E. and S. W. direction. It has three rocky hummocks, with only 6 feet of water on them at low tide. In the channels between these hummocks there are from 4 to 6 fathoms of water, but with westerly winds the sea breaks heavily all over the bank. In the channel between the reef and the islets there are 8 fathoms of water, with a bottom of rock and sand. This channel is only safe to use in smooth weather, during which the tidal-currents form ripples over the reef and aid to point out its situation. To pass between the bank and the islets, keep cape Prioriño Grande shut in with Coitelada point, and to pass outside keep cape Prioriño Chico open of the same point. Coming out of Ares bay, and intending to pass outside of the reef, keep Raso beach open of Ares point till after distinguishing cape Prioriño Chico.

From Miranda point to Coitelada point the coast is broken, rocky, and of moderate height, with rocks scattered along the edge of the cliffs.

CHAPTER III.

FROM CORUÑA TO CAPE FINISTERRE.

Variation 21° 30′ *to* 21° 50′ *westerly in* 1871, *decreasing about* 7′ *annually.*

Northwest coast of the Iberian peninsula. The coast forming the subject of this chapter is that portion known to seamen as the N. W. face of the Iberian peninsula, and dreaded for the severe winds from seaward. It extends about 75 miles in a straight line, and is generally high, rocky, and unsafe, and particularly along the sea-shore looks gloomy and desolate. Happily the bays of Ferrol and Coruña are nearly in the middle of this dangerous line, and in them vessels find shelter in case of need. If not intending to enter one of these ports, it is prudent to keep a good offing in sailing along this part of the coast, especially if there be any signs of wind from seaward.

Coruña bay. The entrance to the bay of Coruña is between point Seixo Blanco on the E. and Pradeiras point, the N. E. extremity of the peninsula of Coruña, on the W. The bay is about 3 miles deep and 2 miles wide. Its shores are generally unsafe and fringed with shoals, the depth of water gradually increasing toward the entrance, in the middle of which the lead gives 18 to 20 fathoms, sandy bottom. There are a number of islets and rocks scattered along the shores of the bay, but they do not extend far out. The more remarkable are, Judios island, near the suburb of Santa Lucia; Santa Cruz island, on which there is a fort, and Canabal islet, which lies between the points of Seixo Blanco and Mera; and finally, at the head of the bay the Burgo river empties into an inlet that is partly filled up by the deposits of the river. N. and N. W. winds enter the bay, and the only good shelter is under the western coast, where the port and town of Coruña are situated. Point Seixo Blanco is high, steep, and safe, and is easily distinguished by a crooked, nearly vertical line of white stones that look like a road. Point Mera, 1 mile S. S. W., is higher than point Seixo Blanco, and on the side of the mountain which overlooks it is a battery of the same name.

Mera bay. South of the somber-colored Mt. Mera there is quite a large bay, at the head of which is the beach of Mera, off which vessels anchor for protection against winds from N. E. to S. E., anchoring in 7½ to 8½ fathoms, E. S. E. of the point; but this bay should only be entered when sure of the weather, or when Ferrol or Coruña cannot be reached, for with N. W. and W. winds it is very much exposed to a heavy sea. In making an anchorage in this bay with an E. wind and heavy N. W. swell, Toniña bank, off the entrance of the bay, must be avoided, for though it has 10 fathoms of water over it, it breaks with a heavy sea. The bearings of this bank are Canabal island, in line with Priorîño Grande, and the islet of Portelo, in the bay, in line with the hermitage of Mosori, near the beach.

Coruña harbor. The northern limit of the port of Coruña is the little island on which stands the castle of San Antonio, and the S. W. limit is the point of San Diego, where there is another castle. The entrance of the harbor between these two points is 5 cables wide, and the harbor itself, 7 cables deep, terminates at the low land, which, with the beach of Argan bay, forms the narrow isthmus joining the peninsula of Coruña to the main-land.

There is but little water in the port, so that only vessels of moderate draught can find a good shelter there. There is a depth of 2½ to 3¾ fathoms, with good holding-ground in the middle, decreasing rapidly toward the town and the Pescaderia. Ships of large draught anchor off the Palloza (a large cigar manufactory in the suburb of Santa Lucia) in 4 to 4¾ fathoms, mud; but these vessels have to anchor E. of the meridian of the castle of San Antonio, where they are exposed to the sea from N. and N. W.

A vessel entering the port without a pilot must keep a lookout for two banks of rocks. One of them, named Gancho, is about 56 feet S. E. of San Antonio castle; it is 46 feet long from N. E. to S. W., with 4½ to 5½ feet of water on it at low tide. The soundings are from 2 to 3¾ fathoms between it and the shore. The other, called Laja de Monelos, is a round and steep rock, with 11 feet of water on it at low tide; it is ½ a cable from the shore, immediately beside the mouth of the brook of Monelos, which flows through a little beach near Judios island. It is in line with the steeple of the church of Perillo and the N. E. angle of the castle of San Diego.

Coruña. Coruña is the capital of the province of the same name, the latter comprising the districts of Sada, Malpica, Camariñas, Muros, and Corcubion. It numbers 30,132 inhabitants. The flag of vessels registered at Coruña is *white* with a *blue* Saint Andrew's cross.

The new town, called Pescaderia, occupies the entire isthmus which connects the peninsula with the main land. Its longest dimension is with the isthmus and facing the port, and it extends back to the beach of Orzan. The old city is terraced on the eastern slope of the peninsula and extends E. to the cliffs of the seaboard. The manufactures of Coruña are glass, soap, starch, coarse cotton stuffs, iron, hats, and salt provisions. There are also extensive fisheries, chiefly of sardines. The coasting-trade is active, employing about 600 vessels, of 70,000 tons. The value of exports in 1863 was $1,980,900, and of the imports, $5,912,900.

Moles. There is a large quay in front of the town, about 1,000 yards long. It covers a large portion of the beach that was dry at low water, but may now be used for building purposes. It also makes it possible for vessels of moderate size to come alongside of the two moles (iron and wood not yet finished) at all stages of the tide. One of these moles in front of the custom-house will extend 656 feet toward the S., and the other, opposite the old mole of Los Cantones, 325 feet S. by E. It is also proposed to build a small basin for boats and small coasters. There is a lazaretto for the convenience of vessels in quarantine.

Moorings. For the convenience of steamers visiting Coruña, there is a mooring-buoy anchored in 4½ fathoms between castle San Antonio and the Palloza.

Water. The boats and vessels belonging to Coruña get water from a cistern built for that purpose on the beach of the Palloza, or a water-boat will come alongside at a moderate price. Provisions are good and plentiful.

Tides. High water, full and change, is at 3h. 30m. The tide rises 9¾ feet at high springs, and 9¼ at neaps; but the tides are more or less influenced by the prevailing winds.

Pilots. There is a corps of pilots who bring in vessels when they are desired. Pilotage is obligatory on vessels of more than 80 tons. When a pilot is wanted, the pilot-flag or any other signal is hoisted at the fore-mast head. The rates are as follows: 240 reals from the outer shoals into the harbor, 200 from the tower of Hercules, 180 from Marola island, 80 from outside of castle San Antonio, and 40 for shifting an anchorage in the harbor. Steamers pay less than sailing-vessels. The *real de vellon* is worth nearly 5 cents.

San Antonio castle.

The castle of San Antonio is 12 cables S. ½ E. of point Pradeiras; it is on an islet surrounded by rocks that leave only a narrow channel for boats to pass between it and the city. The coast toward point Pradeiras is rocky, unsafe, and fronted by rocks extending to the N. The most dangerous of these is the Pedridro reef, N. N. E. of Peña de las Animas. It is intersected by a narrow channel having a depth of 10 fathoms, the outer portion of the reef being named Cabanes bank.

Lights: Lat. 43° 22′ N.; long. 8° 23′ 06″ W.

In 1861 a light was first shown from a tower on the eastern platform of castle San Antonio. The light, *fixed white*, is 56 feet above the level of the sea, and visible 10 miles in clear weather. The tower rises from the center of the keeper's dwelling and is hexagonal, green, and 20 feet high, surmounted by a white octagonal lantern. It is visible all around the horizon, except a small arc intercepted by the land.

Another light was lighted in 1872, on an iron column rising from an octagonal wooden building at the end of the custom-house mole. The light is *fixed red*, is elevated 30 feet, and is visible in clear weather 6 miles.

Peña de las Animas.

The Peña de las Animas is a small rock extending N. and S., and always above water; it is surrounded by reefs which show rocks awash here and there at low water; it lies 1½ cables N. N. E. of the castle of San Antonio, and between it and the N. E. angle of the city is a channel 1 cable wide, but so obstructed by rocks that small boats only can make use of it. (On B. A. chart No. 79, corrected to May, 1873, this rock lies E. and W., not N. and S.)

Mouron bank.

Mouron bank lies 2 cables N. N. E. of Peña de las Animas, and forms a part of the reef which adjoins the latter; it is covered with 11 feet of water at low spring-tides. The sea breaks on this bank and the adjoining reefs at almost all times, and they form the chief danger to be avoided when entering the harbor of Coruña by the wind, or from the westward, in which case a vessel should give them a berth of 3 cables while rounding them until they bear from W. S. W. to W. by N., and then head for the castle of San Antonio.

Cabanes bank. At 8 cables N. N. E. ½ E. from the castle, and E. S. E. of fort Dormideras, is the center of Cabanes bank, which may be considered as an under-water prolongation of Perdridro reef. The least depth of water on it is 8¼ fathoms; between this danger and the reef the lead gives from 10 to 13 fathoms, and between the reef and Pradeiras point from 15 to 17 fathoms.

From Cabanes bank, fort Dormideras is a little open of the northern part of the tower of Hercules; from this position a dimly perceptible grotto, the only one on this part of the coast, can be seen S. E. of the fort and N. of the little beach of San Amaro. In this position, on the S. W. extremity of the shoal, the spire of San Francisco in the city is in line with mount Carboeiro.

Point Pradeiras is abrupt and crowned by a battery. On its eastern side is a reef extending something less than a cable's length to seaward. West of Pradeiras, and as far as point Eiras, the coast is steep, rocky, and unsafe. The projecting point of Herminio is 3½ cables N. E. by E. from the Hercules light-tower.

Hercules light-tower: lat. 43° 23′ 20″ N.; long. 8° 24′ 08″ W. The hill crowning point Eiras is 173 feet high, and on it stands the tower of Hercules, which is of great antiquity. It has a square base, with 8 windows in each face, and is 159 feet high. The light is 332 feet above the level of the sea and shows a *white flash* every 3 *minutes*. It is visible 16 miles in clear weather. The keeper's house, built in two wings, is separated from the tower, and forms a good landmark during the day.

Jacentes bank. The entrance of the bay of Coruña is obstructed in rough weather by a large bank of rocks lying under water off point Seixo Blanco, and on which the depth varies from 5½ to 22 fathoms. The best channel between it and the coast is S. W. of the bank. It is between the bank and Herminio point, and has a depth of 20 fathoms, sandy bottom. From the center of the bank Seixo Blanco point bears E. by S., and the tower of Hercules S. W. ½ W. The most dangerous part of it is called Basuril bank. This has a considerable extent from N. W. to S. E., and has from 5½ to 9¼ fathoms of water on it. With high tides and with a heavy sea it breaks over the entire surface of the bank, as on Cabanes bank. When the sea is very heavy the breakers extend to Seixo Blanco point, and in severe storms they break in the channel between the bank and Herminio point. Under such circumstances no vessel should attempt to enter the port. With a smooth sea it is safe to cross both Jacentes and Cabanes banks.

Directions.

For vessels coming from the W., sailing along the coast, the Sisargas islands are a good landmark to show the position of the port. As they approach they can see mount San Pedro, and as they near it the watch-tower on its summit, where there is a mast and yards to signal vessels at sea. At the same time the tower of Hercules may be seen on the part of the peninsula projecting farthest to N. W.; then the buildings on the brow of Monte Alto, the windmills on the eastern slope of the same mountain, and finally the church-spires in the city, &c.

Coming from the N. W., the tower of Hercules and mount San Pedro, with the large gap E. of the tower, will show the position of the port, while cape Prior, visible to the eastward, will assist in determining the position of the ship.

Coming from the bay of Biscay, it will suffice to sight cape Prior, easily recognized by its steep front projecting to the N. W. and by its light-tower. After making the cape the course may be shaped for Coruña, looking out in bad weather for the banks of Osas, Laxiñas, (page 50,) and Jacentes.

In fine weather, with winds from E. to W. through N., which are free, if no pilot can be obtained, head nearly for point Seixo Blanco and mount Mera until the castle of San Diego is open from the castle of San Antonio; steering then on this course will clear the Peña de las Animas and the adjoining reefs; head for San Diego castle, so as to pass 1 cable from the castle of San Antonio, and when between the two forts anchor according to the vessel's draught. A large vessel can anchor in 5½ to 7 fathoms with San Antonio castle bearing N. by E.; a smaller one may anchor in 4 to 5 fathoms with Seixo Blanco point bearing between the city and San Antonio castle, and light-draught vessels can enter the bight still farther. Sound before anchoring, to be sure of the quality of the bottom, so as to avoid the beds of sea-weed and refuse which abound in this harbor, and which cause the anchor to drag in a fresh wind. Coming in with a light breeze, vessels should keep more toward the W. than the E. shore of the bay, to have the sea more astern, especially if it come from the N. W.

In entering Coruña with a gale from N. N. W. or W. N. W., the best channel is between Jacentes bank and the points of Herminio and Pradeiras. Keep far enough off shore to keep the foot of the tower of Hercules always in sight—the tower must in no case be hidden—in approaching the point of Herminio, which may be doubled at 2 cables' distance. From this point steer E. S. E., keeping the mountain and battery of Mera right ahead until the castle of San Diego is open to the E. of San Antonio, when change course to S. S. W. and round to gradually in approaching so as to pass 1 cable from San Antonio.

Should it be necessary to enter between the Jacentes bank and Seixo Blanco point, (a rather bad channel,) a vessel should near the mouth of Ferrol harbor until south of cape Prioriño Chico, and bring the point of Segaño in line with the hermitage of San Cristobal, which is N. E. of this point, in the bay of Cariño; keep this (stern) bearing as a course until the castle of San Diego is just open of the castle of San Antonio; steer in the latter direction until Seixo Blanco point bears E., when the Jacentes bank will be cleared. Head S. until the battery of Mera bears N. E., and then approach the anchorage as in the preceding instructions.

Having the sea almost always astern in entering, it is much easier to do so than to leave Coruña. In beating in or out, if inside of Mera point, the E. shore of the harbor should not be neared sufficiently to cover Mt. Ventoso by the extremity of the point of Seixo Blanco; on the other board, running for the W. shore, there is nothing to look out for except the shoals and the reefs adjoining Peña de las Animas.

It is better to leave port early in the morning, not only to take advantage of the land-breeze and be outside before the sea-breeze sets in, but also to have the whole day at command to take proper measures should the weather become unfavorable. In order to leave before daylight, a special permit from the captain of the port is needed, which must be sent to the commandant of fort San Antonio.

Without this permit vessels can only leave between dawn and twilight, and then with a pass from the governor and captain of the port, which is sent to the castle before leaving.

Caution. The coast between capes Ortegal and Toriñana forms the N. W. front of the Iberian peninsula, the approach to which at night is so dangerous, and dreaded particularly in winter and during the frequent fogs. It is especially necessary to look out for the currents which often set on shore with great velocity from N. W., and tidal currents, which sometimes cause great errors in the reckoning. During the wet season the land is frequently hidden, though at times the beaches at the foot of the mountains can be made out when they themselves are obscured by the fog or haze. Under such circumstances, a vessel from the W. bound for Ferrol or Coruña, not having time to reach the port before nightfall, should keep off and on, according to the state of wind and sea, without getting to the eastward of the Sisargas islands.

With strong S. W. winds, a swift current sets N. E. between the Sisargas islands and cape Ortegal, and it is not unusual to see vessels swept past their port. It should therefore be very carefully looked out for; for if a vessel is drifted beyond Ferrol, there are no more well-sheltered harbors on the coast except the ports of Barquero and Vivero. The lead should be used constantly, particularly during foggy weather, and it will be a sure guide of any approach to the coast before the breakers are heard.

Osas bank. The Osas bank is formed of submarine hummocks, and is only dangerous in a heavy sea. It lies nearly N. of the tower of Hercules and W. of point Segaño, and is about 4 miles from Eiras point. The soundings upon it give about 18 fathoms, with deep water close to it on all sides. This bank is dangerous in very rough weather, as the sea then breaks on it.

Laxiñas banks. The Laxiñas or Lajiñas banks, lying about 3 cables N. N. W. and N. W. of Osas, are a series of hummocks like the latter, with less water on some of the hummocks, the French sailing directions of 1869 giving 12 fathoms as the least depth at low water, this increasing rapidly to from 22 to 30 fathoms. From the eastern bank Mt. San Christobal is in line with the bay between capes Prioriño Grande and Chico, and the tower of Hercules bears S. ½ E. The western bank is about 6 cables W. of the eastern. The two extend about 1¾ miles E. and W. and 1 mile N. and S., and are dangerous in a heavy sea. Vessels should give them a wide berth in nearly calm weather with a heavy sea from N. W., to avoid being drifted upon them.

Channels. Between the Osas and Jacentes banks the soundings vary from 27 to 37 fathoms, the distance being about 3 miles. Between the Osas and cape Prioriño Grande, about 2¾ miles, they vary from 18 to 37 fathoms. These channels may be used in any weather in going to Coruña or Ferrol, and in case of need vessels can pass between the Osas and Lajiñas.

Vessels from the W. bound for Ferrol will clear the Osas by keeping Mt. San Christobal open S. of cape Prioriño Chico. Vessels from cape Prior for the same port should pass outside the banks, if practicable; but if too near the coast, may pass between them and the capes, giving the shore a good berth.

Vessels bound for Coruña from the W. keep near the coast to round Herminio point and pass inside the banks, and those from the bay of Biscay should pass to westward of them, if the wind and their distance from cape Prior permit; otherwise they may pass between cape Prioriño and the Lajiñas.

Coast. Monte Alto rises from the peninsula of Coruña, and has several noticeable buildings upon it, the most remarkable being a powder-magazine, the farthest W. of the buildings on the brow of the hill. The N. W. extreme of the peninsula is the steep point Eiras, whence a succession of reefs extend ½ a mile to seaward, some of the hummocks uncovering at low tide. Agudela rock, the extremity of the reef, has 2¾ fathoms of water over it. From point Orsan, next to Eiras, the coast trends W. ¾ S. 19 miles to San Aldan point, forming a large bay about 3 miles deep to the S.

Orsan bay. Orsan bay is comprised between the points of Orsan and Mixillosa, distant from one another 6 cables N. E. and S. W. The shores are rocky, except at the head of the bay, where lies the beach of Orsan, which borders the city of Coruña. Orsan bay is shallow and foul; it is open to the N. W., and the sea from that quarter breaks 3 or 4 cables from the beach, so that landing is impossible, and vessels are sheltered only in the little cove of Riazor, on the W. side of the bay, about 5 cables from point Mixillosa. The position of this cove may be distinguished by the hermitage of San

Roque de Afuera, on a height on the N. W. shore. The village of Riazor is built around the cove, and that of Peruleiro is a little farther inland. The inhabitants of both towns are chiefly fishermen.

Coast. Peñaboa or San Pedro point lies 8 cables W. N. W. ¾ W. of Mixillosa. The coast between is steep and rocky, and is overlooked by Mt. Peñaboa, 722 feet high, having a lookout on its summit, whence vessels bound for Coruña are signaled. The point is unsafe, and is surrounded by a reef, of which the 3 islets of San Pedro form a part. These islets lie close off the W. side of the point, and there is a narrow unsafe channel between them and the shore. About 3 cables N. of the point lies the reef of Bosteo, with 6½ fathoms of water on it, which breaks with the least sea.

From Peñaboa point the coast trends S. 9 cables to the little port of San Pedro, open to the N. W., and of no importance. Ferbedoira rock lies ½ a mile N. N. W. of the entrance. It uncovers at low water, and is in line with and between points Langosteira and Peñaboa. Nearly 1½ miles S. W. of port San Pedro is the equally insignificant port of Beus, with a village of the same name on its shores.

Point Langosteira is the northern extremity of a high, rocky, and projecting promontory, named Suevos, with the beach of Langosteira on its western and that of Suevos on its eastern side. On the highest and most projecting portion of the peninsula stand the ruins of the lookout tower of Suevos, and S. S. E. of this lies the town of Suevos. Monticaño, 774 feet high, is a little E. of the Suevos peninsula, and Mt. Corbeiro, or Carboeiro, 1,200 feet high, is 5 miles S. of the watch-tower of Suevos.

Pego bank. Pego bank lies 1½ miles W. of the W. face of the Suevos peninsula, with 14 feet of water on it at low tide, and from 11 to 18 fathoms around it. It breaks with the slightest sea. Vessels will clear this bank, passing outside of it, by keeping the tower of Hercules open from Peñaboa point.

Pero Dento bank. Pero Dento bank, dangerous in heavy weather from N. W., is a hummock with 11 fathoms of water over it, and from 27½ to 36½ fathoms, sand, around it. It lies 2 miles N. ¾ W. of point Langosteira, and breaks with a heavy sea. Vessels should pass outside of it, keeping San Miguel de Breamo, in Betanzos inlet, in line with Torella point.

Port of Cayon. Between the points of Langosteira and Cayon the coast is composed of sand-beaches broken by occasional rocky points, that must be given a good berth, and on the beaches are several villages. The port of Cayon is an unsafe cove, entirely open to N. E., with a beach where the boats are hauled up. The village is built along the beach and at the foot of Pias hill, extending E. and W. and flat on the summit. This hill forms a kind of peninsula jutting to N. E., the most northerly point crowned by the Atalaya de Cayon. The village contains about 540 inhabitants, fishermen.

Landmarks. Nearly 2 miles S. of the Atalaya de Cayon stands Mt. Agudo, about 1,000 feet high, with the chapel of Nostra Senhora de la Estrella on its summit. Farther inland, 6 miles from the coast, and S. E. by S. ¼ S. of Cayon, is the chapel of Santa Marta, at an elevation of 1,443 feet.

Baldayo bay. Baldayo bay is formed by that part of the coast between points Cayon and Harnos, distant about 9½ miles E. and W. It is 2 miles deep to the S., and is dangerous in winds from seaward on account of the heavy sea that breaks in the prolongation of the Baldayo banks. The coast from Cayon point to the point of Ensenado, the eastern extremity of Baldayo beach, is bluff and unsafe. Points Leyra and Saldoiras are fringed by reefs extending out about 2 cables; and ½ a mile from the shore N. W. of the old watch house of Cayon lies Curbina, a rock under water.

Baldayo banks. The Baldayo, sometimes called Roncadoiras, banks lie off the middle of Baldayo beach. The southernmost hummock is about 2 miles from shore, and the bank extends about 1½ miles N. and S. One hummock dries. The channels between the different banks or rocks are from 2 to 13½ fathoms deep, and the fishing-boats use them in fine weather.

The channel between the banks and the beach is quite practicable in good weather or with S. W. winds. The depth in mid-channel is 13½ fathoms. About 1 mile N. E. by N. from the northern hummock of this bank is a small pointed rock, called Cueva de Pomba, with 6 fathoms on it and deep water immediately around it. It breaks with the least sea.

The Atalayero, or Mar de Cayon, a rocky bank 2½ miles E. N. E. of the Cueva de Pomba, is also dangerous in bad weather. It has from 14 to 18 fathoms on it and 27½ fathoms at its edge. It lies about E. of the Hercules light, and to clear it vessels will keep the powder-magazine of Monte

Alto, on the peninsula of Coruña, in line with the most projecting part of the San Pedro island. To clear the Baldayo banks and the dangers N. E. of them, keep point Rostro on with the S. side of Malante island about W. by S.

Channel. The channel between the Baldayo banks and the shore is wide and deep, and ships of any draught may use it, if necessary. Coasters use it in all winds from E. to W. through S., keeping about 1 mile from shore; but with wind from E. to W. through N., they keep about 5 miles off shore, increasing the distance if there is any sea. In such a case the light of the Sisargas islands should not be brought W. of W. by S.

Large vessels sailing along the coast between Malpica and Coruña ought to keep well out with light winds from N. E. or N. W.; but with southerly winds there is no danger in nearing the land, provided the tower of Hercules be not shut in by the coast at the foot of Mt. San Pedro, so as to pass outside of the banks.

Coast. Razo point is at the western extremity of Baldayo beach, which is about 3 miles long, and has a chain of rocks near the middle uncovered at low water, and about 2 cables long. The point is steep, projects to the N. E., and terminates in a chain of rocks 2 cables long, partly uncovered at low water. It is a spur of Mt. Nemio, 1,270 feet high, and is the highest point of this part of the coast. It is of a dark color, and quite remarkable in appearance, as it stands alone in the middle of the low surrounding country. The village of Razo is on the eastern slope of Mt. Nemio, and the port of the same name is an insignificant bight S. of the point.

About 1 mile N. N. W. of point Razo lie the Cetones rocks, with 9 fathoms of water on them at low tide, and on which the sea breaks.

Point San Bartolome, $1\frac{7}{10}$ miles W. by N. of point Razo, is steep, and terminates in a chain of rocks stretching $\frac{1}{3}$ of a mile to the N. E., and has an islet on the eastern side. Plancha point is $2\frac{1}{5}$ miles farther W. N. W., and between the two the coast is steep and crooked, with the exception of the little beach of Muiños.

The port of Malpica is a little bight 2 cables wide and 2 deep, unsafe even for the boats of the coast, lying between cape Hornos and Plancha point, open to the E., with a rocky bottom, and a small beach near its head. The depth of water varies from 1 to 3 fathoms, and the N. shore is fringed with rocks. From Plancha point a chain of rocks stretches northward across the entrance, the channel for entering being near cape Hornos. In heavy weather from N. E. the entrance is impracticable. The establishment of the port is 3h. The tide rises 12 feet in springs and 8½ feet in neaps. The village of Malpica is scattered over the S. E. slope of Mt. Beo, extending across the isthmus of cape Hornos to the beach of Area Mayor; its 1,200 inhabitants are chiefly fishermen, and it is the capitol of the maritime district of the same name. Fish are salted and a few boats are built here. There is no good anchorage for large vessels off the port.

Cape Hornos is the extreme projection of the peninsula of Malpica, steep, with 5 fathoms of water at ½ a cable from its base. The Atalaya de Malpica is a high point on its southeastern side. At 6 cables W. by N. ½ N. from the cape is Broa point, forming with it a bay more than 3 cables deep to the S., having at its head the beach of Area Mayor.

Next is point Broa, from which the trend of the coast is northward to Arenas point, the eastern extremity of cape San Adrian, a high spur projecting more than 1 mile N., a part of Mt. San Adrian, Beo, or Castro, as it is variously called, which is 695 feet high.

Seaya bay.

At 1 mile S. of point Arenas is Seaya bay, 2½ cables wide and of about the same depth, open to the N. W. and unsafe. There is a sand-beach at its head, and 2 cables back of this is the village of Seaya. Vessels can anchor N. E. of the beach, E. and W. with the chapel of San Adrian, about 7 cables inland. At this point the bottom is of coarse sand, and vessels are sheltered from winds from W. to N. when they are not violent and the sea is tolerably smooth.

Malla rock.

Malla rock, 2 cables from the coast and E. N. E. of the chapel of San Adrian, has 5½ fathoms of water over it at low tide, and is the northern extremity of a chain which fronts the coast from cape Hornos to cape San Adrian. In bad weather the sea breaks on Malla and along the coast for about 3 cables out.

Sisargas islands.

The Sisargas islands form part of a large rocky bank extending 2 miles N. from cape San Adrian. At low water there appears to be but one island, the higher land showing several deep cuts or gaps, but at high water these gaps form channels dividing the island into three parts, each of which has a separate name. A few ferns, on which rabbits subsist, grow on the rocks, and on the largest there is a plain cultivated by the light-keepers. The largest or western island of the group is called Great Sisarga; it is quadrilateral, 4½ cables from E. to W., and 3 cables from N. to S. The highest portion is on the N. side of the island, and is 330 feet above the sea-level; it (point Pesqueira) terminates in a chain of rocks extending ½ cable N. N. W., dry at low water, and named Centolleiras.

Light: Lat. 43° 21′ 50″ N.; long. 8° 50′ 13″ W.

There is a light-house on the most northern and the highest portion of the island. The light is *fixed white* with a *red flash* every 4 *minutes;* it is 351 feet above the level of the sea, and is visible 12 miles in clear weather. The light-tower forms an excellent landmark in deciding the position of the Sisargas from seaward, as the islands themselves then appear as part of the coast.

There is a small mole on the southern side of the Great Sisarga for the convenience of the light-keepers, who receive their supplies from Malpica.

Malante island.

Malante, or Atalayero, is connected with the Great Sisarga, and the two form only one island, except at high water. It is 2½ cables long from N. to S. and 1½ cables wide. The reef uniting the two is almost entirely uncovered at low water, but at high tide a channel from 80 to 100 feet wide is formed, which is used by small boats in fair weather. In it there is a well or basin where the boats are afloat at low water, and it is the only landing-place on the two islands. To go from Malante to the Little Sisarga, it is necessary to wade across the reef which unites them. Malante, like the Great Sisarga, is rocky, steep, and highest to the N.

Little Sisarga.

The Little Sisarga is the smallest of the group, and lies farthest south. It is nearly round, with a diameter of 1½ cables. It is joined to Malante by a reef which uncovers at low water, but at high water there is a channel formed narrower but shorter than the one above mentioned. This island lies 5½ cables from cape San Adrian, and the channel between them has some rocks in the middle of it, but may be used in case of emergency. The islands form a bight to the S. W., 1½ cables wide, in which small vessels take shelter from winds from N. W. to N. E. They anchor in 2¾ fathoms at low water, sandy bottom. This is the only spot where sandy bottom is found, all the rest being rocky and dangerous.

Dangers. The rocky bank from which the Sisargas rise extends in all directions for some distance, the depth of water over it varying from 9 to 18 fathoms, increasing to seaward. In heavy weather the sea breaks on it, and vessels should give it a wide berth. One mile N. of the N. point of the large island lies a rocky shoal, called the Cuerpo, with 5½ fathoms of water on it and from 18 to 20 fathoms immediately about it. The breakers forming here in heavy weather reach as far as the islands.

Abada bank, usually called Campana, is another rocky shoal, nearly awash, lying 3 cables N. N. W. of the N. W. point of the same island.

The Mayores, a bank of rocks, covered with at least 6 fathoms at low water, lie 6½ cables N. E. by N. from the eastern point of the same island. The sea breaks on this bank in heavy weather.

The Malantes are two rocks 5½ cables S. E. of the last-mentioned bank. There are 4½ fathoms on one of these rocks and 9 fathoms on the other, with 11 fathoms between them. On the higher rock the sea breaks with the least swell.

Channel. The channel, 5½ cables wide, between the Sisargas and cape San Adrian is very dangerous on account of the rocks in the middle. The most eastern of these lies 2 cables S. S. E. of Little Sisarga, with 3½ fathoms of water on it. It breaks with any sea.

One and one-half cables W. N. W. of this rock is another, half way between Little Sisarga and the cape, and a short distance S. W. of the latter rock is another. These two are almost awash at low water. Between these dangers and the reefs which fringe the Little Sisarga there is a channel, with 5½ fathoms at low water.

In the western part of the channel, south of Campana bank and 4 cables S. W. of the S. W. end of the large island, lies a rocky bank, named Carreira, extending 2 cables S. E. and N. W. and having 2¾ fathoms on its shoalest part. It breaks with very little sea. And finally, the cape is fringed with a short reef, the most projecting points being Lobo islet and rocks, 2 cables N. E. of the W. point of the promontory. The depth in the channel varies from 9 to 11 fathoms, so that at first sight it seems practicable for vessels of any draught, but a large sailing-vessel should never attempt it unless it be absolutely necessary. Coasting-vessels may use it in fine weather if the captain is familiar with the dangers, but in heavy weather the breakers extend all across.

Directions.

To take this channel in coming from the westward, a vessel should have a fresh breeze from W. N. W. to S. W. to be able to make headway against the current which sets with great velocity to the W. with the ebb. It should be remembered also that the wind which is S. W. at the mouth of the channel will haul S. at the eastern extremity of the promontory, making it difficult to double the rocks in mid-channel.

The best and only channel used is between these rocks and cape San Adrian. It is 2 cables wide, with 9 to 13 fathoms water.

Coming from the W., steer for the S. point of the large island on a S. E. bearing until within ½ a cable of it; the vessel will then be clear of Carreira and Campana reefs. From thence stand for the east part of San Adrian point until within half a cable of it in 8 fathoms; then steer E., passing between the point and the rocks.

But a safer way is to enter the channel heading for the southern part of Little Sisarga on a N. E. by E. ¾ E. bearing, which will clear Lobo islet about 1 cable; then steer E. S. E. ½ E., passing the rocks on the point at the same distance.

Coming from the E. keep Lobo islet well open of the rocks on the point or on a bearing of W. ½ N., and on approaching the cape bring the islet on the port bow until the south point of Little Sisarga bears N. E. by E. ¾ E. and the N. and S. points of the large island are in line; then head S. W. in mid-channel, leaving the Carreira bank to starboard.

Vessels obliged to anchor should only do so in the eastern part of the channel, with the north point of the promontory in line with Lobo islet or the western part of the village in line with the eastern point of the bay of Seaya. Here there are 18 fathoms, coarse sand.

Tides.

The establishment at the Sisargas is 3h. p. m. The tide rises 12 feet; the flood sets to the E. and the ebb to the W., with more or less velocity, according to the age of the moon. During spring-tides it is very difficult for a well-manned boat to stem the current of the ebb. The flood is never so strong. At neap tides the ebb-current is still stronger, and it is said that sometimes the set is W., even with a rising tide.

Caution. When N. to N. E. winds are fresh outside they are rarely so strong in the channel, and near the islands they blow in squalls. When nearing this group the reefs surrounding it should be well looked out for. With winds from seaward, cape San Adrian should be given a wide berth, for besides the fact of the sea breaking a long distance out, the currents tend to drift a vessel into the bay between this cape and cape Prior. Vessels from the W. bound for Coruña or Ferrol, and those leaving these ports to make cape Villano, ought to steer farther out than the direction of the coast, especially with fresh winds from the northward.

With strong S. W. winds the current sets with velocity from the Sisargas toward cape Prior, and if the wind shifts to N. W. it tends to drift a vessel into the above-mentioned bay; therefore, a vessel obliged to near the islands on account of the weather becoming suddenly obscure and hiding the land, should carry all the sail possible to avoid being embayed.

Coast. West of cape San Adrian the coast forms, with point Redondo, 2 miles S. W., the bay of Beo, 1 mile deep, with a beach at its head. It is a good shelter for fishing and other small vessels during N. E. winds. West of Beo beach is the beach of Ceiruga, through which the brook of Chances flows.

Barizo beach lies between point Redondo and cape Nariga, or Narija, which latter is moderately high, steep, projecting to N. W., and crowned by a hill with numerous peaks. From its base a chain of rocks extends W. N. W. The cape shelters the little port of Barizo, or Avarizo, on its western side, a little cove completely open to the N. W. The town of the same name is built along the beach, off which boats are partially sheltered at low water by the chain of rocks terminating cape Redondo, extending W. N. W. and partly uncovered at low tide. The sheltered anchorage is in the N. E. angle of the cove, and to reach it a vessel must keep close along the S. W. shore, which is safe, and range the beach to the anchorage, which is in 7 to 8 fathoms.

Cape Eiras is 3½ miles S. W. of cape Narija, and together they form a bay 1 mile deep to the S. E., cut in two by point Escorrentada. The eastern part is called Niñones, and there is a village of the same name ½ mile inland; the western is called Barda. Both of these bays should be given a wide berth, as they are full of dangerous shoals. So also of the points, especially that of Escorrentada, which is a spur of Mt. Faro de Corme, 810 feet high, whose slopes reach the beaches of Barda and Niñones. On its summit stands the chapel of N. S. de Faro, a good mark for the port of Corme.

Cape Eiras terminates in a chain of rocks, named the Abruillas, extending ½ a mile N. and N. E., and at the extremity of the N. E. chain lies the bank of Tremoja. From cape Eiras the coast trends S. W. 1 mile to Roncudo point. It is steep and unsafe, the breakers reaching ¾ of a mile to seaward. This point forms the base of the lofty Mt. Jurita, which has a number of small eminences on it resembling buildings at a distance. On one of these eminences are the ruins of the old tower of Corme. The point for 4 cables' distance is surrounded on all sides by rocks; the most prominent one is Roncudo rock, always uncovered, 4 long cables W. by N. from the point. Inside of this is Canivite rock, also always uncovered. Between the two is a depth of 13 feet, and between them and the shore a depth of 4½ to 6 fathoms. There are rocks under water 2 cables N. N. E. and 2½ cables S. S. E. of Roncudo, and one, called Eiruga, dry at low-water, lies a little more than 2 cables W. of the bay of the same name. Only small coasters can pass inside of all these dangers with a smooth sea.

Corme and Lage bay.

The bay of Corme and Lage, comprised between the points of Roncudo and Lage, is 2½ miles across from N. N. E. to S. S. W., and about 3 miles deep to E. S. E. It is completely open to N. W., and shelter from winds from N. to E. is only found in Corme road, and from winds from S. W. to E. in Lage road. Both are unsafe in winter, and rarely used then by large vessels; coasters sometimes during that season take shelter well inside the coves, but even there are exposed to a heavy surf.

At the entrance of the bay the depth ranges from 23½ to 30 fathoms, diminishing gradually to the beach. Rock predominates about the shores of the bay and is found to some extent in the middle.

Point Carral, which is the western limit of Corme road, is 1 mile S. S. E. of Roncudo point, and forms the base of a hill, on whose summit is a pyramidal pile of stones, and which is named Piedra de la Vela. Point Ostra is 2 cables farther W. by S.

Between Carral and Roncudo points for about 2 cables out there are many rocks, some of which uncover at low water, and a small island named Insua.

Port of Corme. The port of Corme lies between Carral point and Estrella island. It is 4½ cables wide and 4 cables deep to the N. E., and terminates in a high beach more than 2 cables long, and called Estrella or Ermita beach, through which a brook flows, which passes near the hamlet of San Adrian. Farther N. W. there is first the little beach of Gueva de Osmo, and then that of Arnela, each with a small brook, and from any one of these streams excellent water may be obtained.

Along the shores near the entrance of the cove there are several rocks under water, and outside of it are one or two on which the sea breaks, making them dangerous in rough weather. One of these lies 4 cables W. S. W. of Estrella island and 4 cables S. by W. of Corme, and is covered with 9 fathoms water. Vessels anchor off the low shore of the cove in 7 to 8 fathoms, and the depth outside of the entrance is 10 to 11 fathoms, sand and gravel.

Good anchors are necessary, on account of the swell and the violence of the south winds, and vessels moor with a cable fast to the shore on the north and an anchor to the south, small craft lying within a cable's length of the shore near the town.

Corme. The village of Corme stands on the W. bank of Arnela brook, on a sort of peninsula projecting to the S. The houses of the hamlet of San Adrian, which forms the parish of Corme, extend 1 mile N. E. into the interior. At 2 miles N. E. by E. from the ruins of the hermitage of N. S. de la Estrella stands a chapel on Mt. Faro. Corme contains 1,300 inhabitants, chiefly fishermen and sailors.

At the E. end of the beach there is an islet, (Estrella,) difficult to distinguish from the land, with a hermitage on it. Small boats pass between it and the shore at high water only.

From point Estrella to Canteros point, 1¼ miles, is a high coast, which should not be too closely approached. Off Ventosa point the water is shoal, and just E. of it Cobos brook empties.

Canduas bay.

From Canteros point begins a tract of low beach extending to the head of the bight, where rises Monte Blanco, which, from the middle of its height to its small peak, is sandy, and a good mark from seaward. It bears N. E. by E. from the mouth of the river Canduas, which here falls into the sea.

This river traverses and fertilizes the valley of Bergantiños in a course of about 18 miles. It is navigable for about 2½ miles for boats which can cross the bar, where there are from 3 to 4 feet water at low springs. Inside the bar the depth is 11 feet. The wash of the river has formed several sand-banks at and near its mouth.

San Pedro cove.

San Pedro cove lies between the points of Mundiño and Cabalo, the former terminating in a reef 1 cable long, with a rock awash on it. There are two patches of beach at the head of this cove, and through each a small stream flows. South of the cove stands Castle peak, 1,050 feet high; and 4 cables N. E. ½ E. of point Cabalo is a bank always covered, but breaking with the least swell.

Lage bay.

Lage bay, between Cabalo and Lage points, is 1 mile wide and nearly as deep to the S., with a clean beach 6 cables long at its head, through which flows a brook. The depth in the middle is from 7 to 8½ fathoms, and here vessels usually moor with Cabalo point in line with Monte Blanco. Small vessels take up a berth nearer the town in 4 to 5 fathoms. Vessels are protected in winds from S. to E., but in those from S. to W. there is much swell, and it is necessary to be well moored, with a long scope. In a N. W. gale this anchorage is very unsafe.

Lage.

The village of Lage stands on the W. shore of the bay and on the slope of Mt. La Insua. It contains 700 inhabitants, mostly sailors and fishermen. There are two establishments for salting fish; and excellent water, but few provisions may be obtained.

Mt. La Insua forms the eastern extremity of Lage peninsula, which is the western limit of the bay of Corme. On its summit are the ruins of a lookout tower.

Directions—north channel.

Coming from the N. with N. W. winds to take the northern channel between the reef off Roncudo point and the 4½-fathom bank, pass 4 or 5 cables from Roncudo rock, leaving Lage on the S., when Monte Blanco, which is easily seen over the intervening shore and village, bears S. E. by E. ¾ E. Take this bearing as a course until the northern shore of Estrella islet bears E. by N.; steer on this new course until N. and S. with the Atalaya of Corme, steering then E. N. E. for the middle of the cove. A good anchorage is N. and S. with Corme church and E. and W. with the mouth of Cobos river, in 10 or 11 fathoms, fine sand. In sailing on these courses the depths will vary from 18 to 14 and 7 fathoms, so they may be taken by large vessels. Vessels of light draught, with a light or smooth sea, can pass within 1 cable of Roncudo rock and keep closer to the shore.

South channel

To make use of this channel between 4½-fathom bank and Lage point, run for Monte Blanco on a bearing of E. by S. until Estrella islet bears N. E. by E.; take this as a course until Roncudo point bears N. W. ¾ N., when head for Osmo beach in the cove until the anchorage is reached.

In heavy weather vessels should pass a little farther from the bank in entering and then continue as above; though in heavy weather from seaward this anchorage should not be sought except in case of necessity.

In going to Lage the first course is the same until Estrella islet bears N. E. by E., when head for the cove, taking care, especially in working in against a head-breeze not to approach the W. shore too closely, as it is the most unsafe.

Vessels may work into both Corme and Lage by simply taking note of the dangers already spoken of. In anchoring care should be taken to select the parts where the bottom is sand or gravel, and not rock.

Tides.

The establishment at Corme and Lage is 3h. 15m. p. m. The tide rises 14 feet in springs and 9 feet in neaps.

Landmarks.

The best landmark coming from the north along the coast is the group of the Sisargas islands, and coming from the south, cape Villano. These two points are remarkable and distinguished by their light-towers. In coming directly from seaward the large gap in the coast becomes apparent, with Monte Blanco inside. Mt. Faro de Corme, 2⅕ miles E. N. E. of Corme church, may also be seen. Castle peak, another remarkable mountain, will be made out S. of San Pedro cove, on a near approach to the bay.

Pilots.

There are no licensed pilots at Corme, but if one is needed and the signal be made, of hoisting the national flag at the fore and firing a cannon, a boat will put out from the town to pilot the vessel in.

Coast.

Lage point, the northern extremity of Lage peninsula, terminates in a reef extending 1 cable W. N. W. and 2 cables N. E., the latter portion being partly dry at low water. The Acorhados rocks lie 2½ cables N. N. W. of the point and uncover at low water. At high water boats pass between them and the shore, and outside of them there is a depth of 8 to 9 fathoms, rocky bottom.

From Lage point to cape Villano, 10 miles, the coast trends about W. S. W., and consists of high, rugged shores and beaches, separated by rocky and unsafe points. The first point, named Morelo, forms the base of a small hill, and is surrounded by rocks. The next, named Catasol, is high, of a reddish color, and surrounded by rocks extending about 3 cables, one of them, always uncovered, being named Tain. After this comes Guvadelle point, the two latter being the limits of the long beach of Traba, on which are two villages. Port Camello, on the W. side of Guvadelle point, is a little cove with a beach at the head, where fishermen take shelter during southerly winds. In anchoring they have to keep well clear of both shores, as they are lined by reefs.

About 3 miles W. of Camello bay is cape Veo, at the base of Mt. Veo, which is remarkable and easily distinguished by the patches of very white sand that cover two-thirds of it and form a strong contrast to the black earth of the rest. It is 823 feet high and is an excellent landmark when bound for Corme or Camariñas. At the foot of Mt. Veo there are some islets and under-water rocks extending about 1 mile out, and there are others between the cape and the port of Camello.

At 1$\frac{3}{10}$ miles W. S. W. ½ W. from cape Veo is cape Trece, (sometimes called cape Tosto,) low but surmounted by whitish heights, which make it easy of recognition. Cape Villano is 2⅓ miles S. W. from cape Trece, and with it forms Villano bay, which has an almost continuous beach-line. The beaches form a long white line broken by the black point of Forcados, and are useful in recognizing the bay and the cape itself.

There is good anchorage off Pedrosa beach for any class of vessels with winds from E. to S. W. But they should weigh at the first appearance of wind from seaward. Care must be taken to keep clear of the reef jutting out for more than ½ a mile from Forcados point to N. W.

Caution.

All the portions of the coast just described should be given a wide berth, for it is lined almost throughout by rocks and reefs extending out more than ½ a mile. Among the former is an isolated group, named Baleas de Tosta, whose western extremity is ⅔ of a mile N. W. of cape Trece. These rocks lie W. N. W. and E. S. E., and a few of them uncover at low water.

Cape Villano.

Cape Villano is a promontory, moderately high, almost perpendicular, and terminating in a point, named Estrufo, jutting to the N. This cape, also called Vilano, is remarkable from a peak near its extremity, of a reddish color and shaped like a conical leaning tower, 410 feet above the sea-level. Seen from seaward at some distance, the cape is confused with the heights in rear; but seen from the N. E., it looks like a ruined castle, and from a distance like a schooner under sail.

Light: Lat. 43° 9′ 50″ N.; long. 9° 12′ 58″ W.

On that part of the cape projecting farthest N. there is a light-house, at an elevation of 225 feet, showing a *fixed white* light visible 10 miles in clear weather.

Bufardo bank.

Villano isle is a short distance from the northern extremity of the cape. On it are a number of elevations lower than those of the cape, and it is called Villano de Fuera. Boats can pass between the islet and the cape in very fine weather, but 4 cables N. W. from the cape lies the dangerous rock or bank of Bufardo, a pyramidal rock of small extent and always covered; in the lowest tides it can be seen in the trough of the sea, which constantly breaks on it.

Between Bufardo and Villano de Fuera there is a channel varying in depth from 9 to 18 fathoms, rocky bottom; and around the bank the depth is 18 fathoms. This channel may be used in case of absolute necessity, passing about 110 yards from the islet.

Coast.

From cape Villano the coast trends S. W. for ½ a mile to Cuerno point, which is low, with rocks extending for 2 cables around it, they being generally visible and steep-to. 1⅗ miles S. by E. ¾ E. from Cuerno point is Virgin point, the base of Mt. Farelo. Between the two the coast is high, steep, and rugged, with rocks along the base, those farthest out being the Betanzeyra, Farelo, and Cangrejero rocks, which lie 2 and 3 cables from shore, and on which the sea usually breaks. On the summit of Mt. Farelo is the remarkably white hermitage of Nostra Senhora del Monte.

Camariñas bay. Camariñas bay, between points Farelo and Barca, is completely open to N. W. It is 1 mile wide and 2 miles deep to S. E. On the N. E. side of the bay a bight opens 1 mile long and 6 cables deep, extending N. and terminating in a narrow and shallow arm. The town of Camariñas, off which there is an anchorage, is at the entrance of this bight, on its western side. The rest of the bay is almost surrounded by a steep coast, with shoal water near the shore, and with no shelter from winds from N. to S. through W. There is a depth of 12 fathoms at the entrance of the bay and 5 to 6 fathoms in the middle, shoaling gradually to the shore. There is, as a rule, sandy bottom.

Camariñas is a tolerable port of refuge for vessels that can lie near the town, but large ships, which have to anchor farther out, are in some danger from the heavy sea. It is much used by coasters bound from S. to N. when they cannot double cape Villano, and those going from N. to S. put back to Camariñas when they cannot double capes Toriñana and Finisterre.

About ¾ of a mile S. E. from Virgin point is the point of Castillo Viejo, and between the two is a bight, called Lago del Norte, much obstructed by rocks. The rocky bank of Cangrejero lies 3 cables W. of Castillo Viejo, with 8 feet of water on it and 22 feet between it and the point. It is nearly in line with and between points Virgin and Castillo Viejo. 4 cables east of Castillo Viejo is the point and fort of Castillo Nuevo, which should be given a wide berth, as there are only 2½ fathoms water at 2 cables southward.

Port of Camariñas. The port of Camariñas is 1 cable wide and as deep to N. W., a little bight, in which is the islet of Corveiro. On its western side are two moles inclosing a little basin. The port is surrounded by sand-banks, which uncover at low water. It can take in vessels drawing from 7 to 9 feet, if they take advantage of high tide, but they are stranded at low water. Fishing-boats and coasters moor inside the basin.

Camariñas. The town is built along the bight, and stretches N. to the village of Buria. N. W. of it rises a hill called the Atalaya. It contains 1,200 inhabitants, nearly all fishermen or sailors, and it is the capital of the maritime district of the same name, which employs a number of coasters and many fishing-vessels. Water is good and abundant, and provisions may be obtained here.

Large vessels anchor in 4½ fathoms off the town and about 3 cables E. of point Castillo Nuevo; They usually moor E. and W. The southerly winds are most to be dreaded; but if the anchors drag with them, the vessel is drifted into the mud of Vasa cove without accident.

Vasa cove. Vasa cove opens E. of Insuela point, extends 8 cables N., and is 1½ cables wide. It is nearly filled up by a mud-bank which is cut by the brooks of Valadares and Trasteiro. This inlet is the best shelter near Camariñas from gales from seaward. The depth ranges from 1 to 2½ fathoms at the entrance of the inlet, diminishing gradually to the banks, that uncover at low water, where vessels that have lost their anchors may drift into the soft mud without injury. At the head of the inlet stands Trasteiro peak, a rather oddly-shaped little hill.

Puerto river. From Vasa cove the coast is steep and impracticable as far as Sandia point, except the little bight of Mozogordon. S. E. of the point opens the channel of the Puerto, a crooked arm of the sea extending about 2 miles N. E. and from ½ to 3 cables wide. The shores are alternately flat and steep, with mountains and valleys behind them, and on them stand San Pedro del Puerto and several less important villages.

The river itself, which flows through the Soñeira valley, washes down a great quantity of sand, that has almost filled in the channel, so that at the bridge of Puerto, where the river empties into the bay, the banks uncover on each side of the narrow channel of the current. Several small streams join the Puerto near its mouth.

Coasting-vessels trading with the towns along the banks enter the Puerto channel, but their greatest draught is from 6 to 7 feet, and they can rarely cross the bar except at high spring-tides.

Lago bay. Between Roda point, the southern limit of the Puerto channel and Marejo point, the coast, comprising several rocky points, forms the beaches of Barreira and Lago. Lago bay is a bight open to N. W., and is only used for sardine-fishing during the easterly winds. Lago brook empties at the beach, and the village is on the east bank.

Merejo bay. Merejo bay lies between Merejo point, surmounted by a fort, and point Chorente. It is open to the N., is 6 cables wide and 8 deep, and along the shores are several beaches, the largest being Area Mayor, at the head of the bay. On the W. bank of Negro brook, which empties here, is the ruined convent of San Martin. Merejo beach lies 3 cables S. of the point of the same name on the eastern shore, in a little bight called the port of Merejo. The village, which contains a salting establishment, is about 225 yards from the beach. The depth varies from 2½ to 5½ fathoms in the middle of the bay, mud and sand. This is a good anchorage during southerly winds.

N. E. ¾ N. of Chorente point, at 2 cables' distance, lies Aguieira bank, which uncovers at low-water springs. Between it and the point the depth varies from 2½ to 4 fathoms and small craft use this channel in fine weather. Chorente point, high, steep, and rounded, is crowned by a low conical hill, named Corpiño de Chorente. On its eastern side are some rocks, that must be given a good berth in entering Merejo bay.

Mugia bay. Mugia bay lies between the points of Chorente and Cuervos. South of the former the coast is less steep, and slopes toward the isthmus forming Mugia bay, at whose entrance there is a depth of 1½ to 3 fathoms, sand and rock. Boats belonging to this section of the country anchor in this bay with winds from S. to W., but with N. W. winds they go to Camariñas. The only dangers to avoid at this anchorage are Cuervos rocks, at the base of Mugia mountain, and the rocks off Espiñeiro point, on the eastern side of the bay.

The town of Mugia extends along the shore from the southern slope of the hill to the isthmus. It contains 1,000 inhabitants, who are engaged in the coasting-trade and the fisheries.

The Quebrantas. The Quebrantas, off the entrance of Camariñas bay, is a dangerous rocky shoal, about ½ a mile long N. N. W. and S. S. E., with depths of 1½ to 7 fathoms on it, except at the north end, which at low water shows a head of rock resembling a buoy. From this end of the shoal, which is called the Great Quebranta, cape Villano bears N. E. by E. ¾ E., distant 1½ miles, and the chapel on Barca or Cruzes point S. ½ W. 1¾ miles. The S. E. end of the shoal is named the

Little Quebranta, and the above chapel bears from it S. ¾ W., distant 1¾ miles. It has 1¼ fathoms of water on it, and the sea breaks on it with any swell. Vessels should never attempt to pass between these two.

At about 1½ miles W. by S. from the Great Quebranta lies another rocky shoal, with 5½ fathoms over it, and the sea breaks on it during a heavy swell from the westward.

There is still another rocky shoal, with 4 fathoms over it, from which the Great Quebranta bears N. by E. ¾ E., distant 1⅙ miles, and Barca point S. E. 1 long mile. It is called Meixon de Juanboi. Coasters pass over it with a smooth sea, but give it a wide berth in heavy weather.

Directions.

Entering Camariñas bay with the wind from the eastward, keep cape Villano aboard, taking care to avoid Bufardo rock, which will be known by its breakers, and may be passed on either side. The rocks off Cuerno point may be approached to a quarter of a mile, as they are steep-to. From thence steer to pass ½ a mile from Virgin point, and when midway between the two points of entrance haul to the eastward little by little, giving the inner points a berth of ⅓ of a mile, when, with a couple of short boards, a vessel will gain the anchorage abreast of and a short ½ mile from the beach of Camariñas, sandy bottom, and in 4½ fathoms water. If the wind is too strong for a vessel to work in, temporary anchorage may be found, where convenient, in the bay or in Merejo bay, which is safe with all winds but those of N. W. Entering with westerly winds, give a wide berth to the Quebrantas shoal, and run in mid-channel between it and Barca point. The channel north of the Quebrantas should only be used in fine weather, and with a steady wind.

Vessels unfamiliar with the bay can obtain a pilot by making the usual signal.

Tides

The establishment of the port at Camariñas is 2h. 33m. The tide rises 13 feet at springs and 9 feet at neaps. With heavy S. W. or N. W. winds the tides are highest. The average velocity of the tidal current during springs is $2\frac{3}{10}$ miles and during neaps 1½ miles per hour.

Landmarks.

In coming to Camariñas from the S., the best marks are capes Finisterre and Toriñana, and from the N. cape Villano. In coming from seaward, Mt. Faro, 1,434 feet high, 5 miles E. by S. from the entrance, will be recognized.

On a nearer approach the hermitage of N. S. de la Barca, on Barca point, and that of N. S. del Monte, on Virgin point, both very white, will be seen. At night the Villano light is a guide, but it is hidden before the entrance of the bay is reached.

Coast.

Barca point, forming the western limit of Camariñas bay, is the northern extremity of a high dome-shaped peninsula, called Mt. Mugia. On its northern slope, and at a little distance from the point, stands the hermitage of N. S. de la Barca. This point is also called Cruzes point.

The reef surrounding the base of Mt. Mugia commences at point Apel, on the western side, and ends at Cuervos point, off which, at 1 cable's distance, lies a rock of the same name. In the reef are several isolated rocks that uncover at low water. The farthest out and the most dangerous of these is Peneiron rock, 2 cables N. N. W. of Barca point, which is uncovered at low spring-tides. In entering Camariñas bay, coming from the S. W., vessels should give a wide berth to Mt. Mugia.

At about 1¾ miles S. W. by W. ½ W. from Barca point is the point of Buitra, high and steep and crowned by Mt. Alto de la Buitra, which is also steep and 500 feet high. The coast between forms a bay, in which are the beaches of Lorido and Arnelo, separated by projecting points. A brook flowing through Lorido beach, a town at the foot of a mountain, the mountain itself, and a point near, bear the same name. Mt. Cimo adjoins Mt. Lorido, and is 985 feet high. About 3 miles S. W. ½ S. from Buitra point is cape Toriñana, forming with it a bay surrounded by a high rocky shore. The town of Cimo is on the south side of the bay, on a brook of the same name. Mount Yeguas is near the water's edge on the S. W. side of the beach of Cimo.

Cape Toriñana.

Cape Toriñana, the most westerly point of the Spanish coast, is a low and small peninsula jutting to the N. W., with steep shores and a flat summit. It is joined to the coast by a low isthmus, so that in approaching it, sailing along the coast, it looks like an island, and from seaward is blended with the high land in rear. A chain of rocks extends 6 or 7 cables N. N. E. from the base of the cape, the northern extremity of which is in line with Buitra point and the chapel on Virgin point, and a small rocky islet, high and round, with two small peaks, lies off its western face at a short distance, and is prolonged to S. S. W. by a reef.

Toriñana rock (sometimes called Farelo) lies 5 cables W. by S. from the island. It is a small hummock which uncovers at low water, and is always marked by breakers. There is a deep channel between the rock and the coast, but it should only be used in case of absolute necessity.

Caution. Much caution should be exercised on this dangerous coast, of which it is more than probable there are other dangers than those marked on the chart. In May, 1833, H. M. steam-vessel African struck on a sunken rock, from which cape Finisterre was said to bear S. by W. and cape Toriñana E. S. E., distant 1 mile. This rock had been previously seen from H. M. S. Confiance, when the sea was breaking over it.

It is possible that this rock is identical with Toriñana rock, described above.

Coast. From cape Toriñana the coast trends first S. S. E. and then S. S. W. to cape Navé, about 9 miles S. It is rugged and rocky, rising abruptly to an elevation of 815 feet ½ a mile inland. It is unsafe and completely exposed to the ocean-waves, which with westerly winds attain a considerable height. With these winds vessels should give this part of the coast a wide berth, as both the sea and current set to the shore. The tidal current passing capes Toriñana, Navé, and Finisterre set N. with the flood and S. with the ebb, varying in force and direction according to the prevailing wind. The northerly current, which always has the greater velocity, is sometimes 1 mile per hour.

Monte Gordo, S. E. of cape Toriñana, is a steep mountain, whose barren slopes extend N. to the cape and S. to Lemiña point. Its western slopes reach the sea-shore and terminate in Monte Gordo point. A ruined watch tower stands on its summit, and on the north side of the mountain is the village of Toriñana.

At 4½ miles S. of the cape is Lemiña point, with the bay and beach of the same name on its south side. Vessels may safely anchor off the beach during N. E. and E. winds in 6 to 8 fathoms, sand, (but not in deeper water, for there the bottom is rocky,) abreast a rivulet, where water may be had. The north shore of the bay is foul. There is a village on the southern bank of the stream near its mouth. The position of the bay is easily recognized by a hill of white sand, 685 feet high, on the north shore. Lemiña village lies west of this hill.

From thence to the Navé the coast is bold, with some small bays and patches of beach, but none of them deserving notice. A few rocks and islets are scattered along, close to the shore.

The Navé of Finisterre is high land with a flat summit, having its foot, cape Navé, washed by the sea. About a third of its height above the sea is a short projection with hummocks on it. A small but high island lies at the foot of the Navé, and at 1¾ miles W. by N. from it is a small ledge, called the Muniz or Munis rock, with 3 fathoms water on it, upon which the sea breaks in bad weather. It is steep-to, having 20 to 30 fathoms around it.

From cape Navé to cape Finisterre, 2¾ miles, the coast is steep, and about half way between them is a depression of the high land, which forms an isthmus, connecting cape Finisterre with the main land. Part of the land between the beach of the isthmus and the town of Finisterre is cultivated.

Cape Finisterre.

The remarkable promontory of cape Finisterre is the last spur of the Pyrenean Cordillera. It rises brusquely from the sea, and is joined to the continent by a low sandy isthmus 4 cables wide. The peninsula forming the cape is 1½ miles long from N. to S., neither so high nor so flat as the Navé, but more uneven on its summit. It is of steep ascent, and the landing under it in the most favorable weather is extremely inconvenient. The ruins of a watch-tower show on the most southern peak, and on the eastern one the ruins of the hermitage of St. William. The town is on the N. E. slope of St. William's peak.

Light: Lat. 42° 52′ 45″ N.; long. 9° 15′ 24″ W.

The light-house on the south point of cape Finisterre exhibits a *white revolving* light, attaining its greatest brilliancy every 30 *seconds*. It is 466 feet above the sea-level, and is visible 20 miles in clear weather.

Caution.

Cape Finisterre is not easily distinguished from a distance, as it is blended with the high land back of it, but on approaching it the white light tower will be seen. In gloomy weather, from seaward, it is sometimes confounded with the mountains north of Muros harbor, but this error may be avoided by remembering that if high land is seen to the south of the cape, it is Mt. Louro, otherwise it is cape Finisterre. If the weather be clear enough to see Mt. Pindo, south of Ezaro bay, remarkable for its rough and jagged appearance, as well as for its great height, it will be easy to steer for cape Finisterre, which lies W. ½ S. of this mountain.

Dangers. The cape is surrounded by some banks, which must be looked out for.

The Turdeiro ledge is more than 1 cable S. of the point of the cape. It is a large rock with 2 fathoms water over it, and on which the sea always breaks.

Centolo island is round, high, and steep like a truncated cone, lying about 2 cables off the western face of the cape.

Peton de Socabo is a rocky ledge, with 5½ fathoms over it, on which the sea breaks when it is heavy. It is nearly 1 mile S. W. by S. from the cape, and between it and the Turdeiro there is a deep channel.

The Carraca is a rocky ledge, 1 long mile N. W. by W. from the Centolo, covered with 3 fathoms water, on which the sea breaks almost always. The channel between the Carraca and the Centolo has a depth of 17 fathoms, rock.

CHAPTER IV.

FROM CAPE FINISTERRE TO THE MIÑO RIVER.

Variation 21° 40′ *W. in* 1872, *decreasing about* 4′ *annually.*

Coast.

The coast from cape Finisterre to the frontier of Portugal, on the river Minho, or Miño, 64 miles to the southward, is much broken by a series of inlets and bays. The headlands are rugged and uneven, and as many dangers lie some distance off shore, the approach is dangerous at night or in thick weather. In the daytime, if the weather is clear, the coast may be seen 25 to 30 miles distant, the land near the shore being generally high, and some of the mountains not far inland attaining altitudes of 1,400 to 2,000 feet.

Corcubion bay.

The deep bight immediately eastward of cape Finisterre, between it and Remedios point, is about 7 miles wide. From the cape the coast runs to the N. E., and is high and precipitous for about 1½ miles to the village of Finisterre, inhabited only by fishermen, on the shore of a small bay. The shore in front of the village and ½ a mile north of it is skirted with rocks at a distance of 3 cables; then begins a low beach about a mile in length, called Lagosteira, and a long ½ mile beyond it is Sardiñeiro point, which is high and steep.

During the season of northerly winds a well-sheltered anchorage may be found off this portion of the coast. A large ship can anchor E. and W. with St. William's peak, or farther in off the church of Finisterre, in 11 to 12 fathoms, about 2 cables from shore, and while sheltered from the N. E. winds is n position to make Corcubion or put to sea if threatened with bad weather from seaward.

The anchorage off Lagosteira beach is nearly N. and S. with the eastern extremity of the beach, and is the most sheltered of an the bay outside of Corcubion harbor, with winds from N. W. to N. E. The anchorage is 2½ to 3 or more cables from the land, in 9 to 11 fathoms, sand, but good holding-ground. Vessels should weigh at the least appearance of wind from the S. E. or S. W. quarters, as all on-shore winds are dangerous here.

Sardiñeiro bay. This inlet, running in a mile to the northward, between Sardiñeiro point and cape Nasa, is about 12 cables wide at the mouth. Lying in the middle of it is a small rocky patch, and at its head are two spots of low shore, named Esteiro and Sardiñeiro, where there are villages of the same name, and at the former, a rivulet. The bay is never used except by fishing-vessels.

From cape Nasa, which is high and steep, a high level shore runs eastward 1¼ miles to cape Cé, which is the west point of entrance to the harbor of Corcubion. Cape Cé is a high bluff, with an octagonal granite light-tower standing 36 yards within its extremity. It should be given a berth of 3 or 4 cables, as it is bordered with rocks, and shoal-water extends some distance off.

Light: Lat. 42° 54′ 50″ N.; long. 9° 09′ 20″ W. The light-tower on cape Cé, above mentioned, shows, at an elevation of 82 feet above the sea-level, a *fixed red* light, visible 8 miles in clear weather. Both day and night it is an excellent landmark in making the harbor. The light-keeper's dwelling adjoins the back of the light-tower, and both are painted white.

Corcubion harbor. During the winter and in a southerly gale all that part of Corcubion bay just described should be avoided, as from cape Cé to cape Finisterre it is then one mass of breakers.

Corcubion harbor, extending 2 miles northward, with a varying width of 4 to 8 cables, lies between cape Cé and Galera point, 1¼ miles to the S. E. It affords good anchorage for all classes of vessels, and is well sheltered from all winds but those from the southward, which send in a heavy sea. Even this is partly broken in force, however, by the banks and shoals outside. Its shores are high, with several small coves and patches of beach, two of which are near the head of the inlet. About half way in are two forts, now unoccupied; that on the west shore named Cardenal, and that on the east Principe. The distance across abreast the forts is 6½ cables, but the inlet narrows toward its head, where on the west side stands the town of Corcubion, with a population of about 1,200, and on the east side, called Fernelo, is a small river, and farther in on the same side is the town of Cé. The inhabitants of these places are principally employed in fishing and raising cattle. The little cove of Cé has gradually filled up with sand and *debris* washed down by the brooks of Cé, Molinos, and Castro, so that the mole of the town is disused, and boats of 4 feet draught cannot reach the town except at high tide.

Anchorage.

The usual anchorage is between the forts, in about 11 fathoms water, sandy bottom, the depth gradually decreasing to within a short distance of both shores. Vessels sometimes anchor farther in, abreast the beach of Fernelo, in 7 fathoms; but in winter the former anchorage should be preferred, for, should the wind come in from the southward and blow hard, the vessel would tail near the shallows at the head of the inlet, and have no room to veer or let go an anchor, should she drive or part.

Care should be taken in anchoring, by the use of the lead, to avoid the rocky patches of the bottom.

Water and provisions may be obtained at Corcubion, where there are also life-boats and good ship-carpenters, if repairs are necessary.

Ezaro bay.

Galera point is low, with a number of large rocks near it; but the bottom close to them is clear and the water deep. The coast trends easterly from Galera point, and then south and westerly to Piñeiro point, at the foot of Mt. Ezaro, forming the bay of this latter name. In this little bay there is good depth of water, and at its head a flat shore with a small river, where water may be procured, which comes down through a gully in the middle of high land. There is a good anchorage nearly abreast Piñeiro point, in 7 fathoms, mud.

On the south shore of the bay, just inside of Piñeiro point, is Pindo cove and village, sheltered from the winds from seaward by the point and a reef extending to N. E. from it. An anchorage is often sought here by fishing-vessels.

Mt. Ezaro, 1,620 feet high, stands E. N. E. of the head of Ezaro bay, sloping to the shore.

Coast.

From Piñeiro point the coast trends W. S. W. and S. W. to Quilmas point, and then S. by E. 2½ miles to Caldebarcos point. The coast between these, being the base of Mt. Pindo, is high, and skirted by rocks extending in some cases 2 and 3 cables off shore. Mt. Pindo, 2,153 feet high, is of a dark color, barren, with a serrated summit. On some of the charts Mt. Pindo is called Mt. Lezara.

Farther south lies the bay and beach of Carnota, and then follows Remedios point. Carnota bay 1½ miles deep to the east, is surrounded by highly cultivated valleys, separated from the sea by a broad sand-beach; but it is completely exposed to the sea-winds, and has an unsafe, rocky bottom.

The fishing village of Lira is on its southern side, and 1 mile inland, on the slope of Mt. Galera, is the town of Carnota, the county-seat.

Dangers.

At ⅔ of a mile S. ½ W. from cape Cé is a small rock, covered at high water, called the Carromeiro Chico. It has a rocky ledge extending southerly 2 cables, beyond which the water is deep across the channel between it and the Lobeira Grande islet, nearly 1½ miles S. by W. At 2 cables from its north side there are 4 fathoms water, increasing to 6, and then shoaling to 3 fathoms on the edge of the bank jutting out from cape Cé.

About 1 mile S. E. by S. from the above rockis an islet, or rock, named Carromeiro Viejo. It has large rocks on its east and south sides, with shallow water all round, but only to a short distance, for at 1 cable off there are 11 fathoms, and soon after 17 and 22 fathoms.

Between this islet and Lobeira Grande the channel is 1¼ miles wide, clean and deep, as it is also between the islet and Quilmas point, on the south, between which there is summer anchorage. It is necessary to give a berth to both sides of this latter channel, but in case of doubt the safest plan is to pass nearer the islet than the shore, on account of the Asno shoal.

The Asno shoal lies ½ a mile N. E. of the islet, with the N. E. part of the islet on with the S. E. part of the Lobeira Grande and Galera point on with the low shore of the Fernelo. Large vessels, if requisite, may pass between this shoal and the shore.

The Bueyes, (the Oxen,) about 3½ cables south of Galera point, are three large rocks, forming a triangle, and resembling three fishing-boats lying together. They are clean and have deep water on all sides, except the west, from which a rocky ledge projects more than one cable, and at its extremity the depth is 5 fathoms. Vessels may pass between these rocks and the east shore, between them and Galera point, and between them and the Asno shoal. The latter passage carries 9 to 13 fathoms, but is narrow.

The Lobeira Grande is an islet broken into a large cluster of rocks lying N. N. W. and S. S. E. From its center cape Finisterre bears W. by N. 3¾ miles and cape Cé N. ½

E. 2¼ miles. At 1 cable's distance all around the bottom is clean and the water deep.

The Lobeira Chica, nearly 1 mile S. E. by S. from the Lobeira Grande, with a clear passage between of 18 to 20 fathoms water, is a similar cluster, but smaller and intersected by numerous channels, through which fishing-boats pass at high water. It is low, and in a swell the sea washes over it. Shoals surround it in all directions, but especially on the S. E. side.

Duyo rock is a dangerous patch, with 2¾ fathoms water over it, 4 miles S. E. from cape Finisterre, in a direct line between that cape and Remedios point. It is of small extent, with deep water close to on all sides.

According to the French sailing directions of 1869, there is a shoal, called the Chan, ½ mile E. of the Duyo, covered with 4½ fathoms water, which breaks with the least sea. This does not appear on the charts, but there is a sounding of 5½ fathoms given about ¾ of a mile a little to the northward of E. from the Duyo, with a deep channel between.

At nearly a mile westward from Remedios point are some large rocks, always above water, surrounded by shoals, named Miñarzos. The passage between these rocks and the ledge bordering the coast is used only by coasters; and finally,

At a distance of 1¼ to 1¾ miles, and between the bearings of N. ½ W. and N. N. E. from the Miñarzos, are other dangerous shoals, called the Arrosas and Arrosiñas.

It is probable that the dangers described in the last four paragraphs are peaks of a vast submarine plateau extending N. N. W. from Remedios point.

Directions.

Bound into Corcubion harbor with a leading wind from S. E. or S. W., steer toward the Lobeira Grande, passing it on either side, (leaving it on the starboard hand is preferable,) and then between the Corromeiro Chico and Corromeiro Viejo for the entrance, passing also about half way between Corromeiro Chico and Galera point.

With a N. W. wind it will be better to pass between cape Cé and Corromeiro Chico, keeping nearer the latter than the cape. Haul to the wind directly the shoal ground off the latter is passed, anchoring where the vessel can fetch; or, if the tide is flowing, beat up to the anchorage between the forts.

If unable to beat into the port with a N. E. wind, (as is generally the case during the northeasters of summer,) anchor either at the entrance or off Lagosteira beach, or on the east shore, with Corromeiro Viejo bearing about N. N. W., and Lobeira Grande W. S. W. This latter is a good berth, and much used by coasters.

Coming from the north with a free wind, pass about 5 cables from cape Finisterre if the sea is smooth, or outside of the Peton de Socabo in rough weather.

Coming from the south, a large vessel should keep outside all the dangers, by bringing cape Finisterre to bear N. just before coming abreast of Louro light. Then when the Lobeira Grande bears N. E. or cape Cé N. E. by N., steer to pass the Lobeira as above directed. By steering in this way vessels will also clear the Meixido and Ynsua rocks and other dangers farther south.

To enter at night, vessels should have a good leading wind. In this case bring cape Finisterre light to bear N. and cape Cé light N. E. Steer on this latter bearing until 1 mile from the light, when keep off to starboard to make out the buoy of Carromeiro Chico or the breakers of the bank, leaving them to starboard if it is desired to pass inside. Or a vessel may steer directly for the Lobeira Grande. Leave it to starboard and proceed as above directed.

Pilots.

There are three licensed pilots in Corcubion bay, two of whom are stationed at the port of Finisterre, from whence they board vessels to take them into Corcubion harbor, and it is advisable for any vessel entering for the first time to anchor at this port to take one on board.

Tides.

The establishment of the port of Corcubion is 3h. p. m. Spring-tides rise 11 feet and neaps 6 feet.

Coast.

Point Remedios is low, rocky, and well projecting to the westward, with a number of islets at its foot. It is a prolongation of the base of a conical hill, called Faro Chico, which stands ½ a mile from the point, and on whose summit is the little hermitage of N. S. de los Remedios, which is difficult to make out at a distance. A little east of Mt. Faro Chico rises Mt. Faro Grande, shaped like the first, but a little higher. From a distance S. W. these two hills look like two islands, the surrounding country being very low. South of Remedios point the coast is bluff and skirted by rocks extending ½ a mile off shore.

Point Ynsua, a long 2 miles S. S. E. from Remedios, is steep and unsafe, a reef extending 5 cables S. W. from it, but north of it there is a little beach where a landing may be effected. At 1 mile farther southeastward is Lens point, low, with a reef running out for ½ a mile and some rocks that are covered at high water. Mt. Larayo, conical, rocky, and moderately high, rises 1 mile N. E. of the point, which is hard to make out from seaward, but is a good mark when near the entrance of Muros bay. There is another barren hill, called Mt. Cabazo, N. E. of Mt. Larayo.

At about 2 miles S. E. from Lens point is Mt. Louro, which forms the western extremity of Muros bay. The bay between these two points has a flat, clean shore, called Arena Mayor, which extends across to Muros bay, separating Mt. Louro from the other hills on the north and giving it, from a distance, the appearance of an island. Vessels sometimes anchor off this beach during winds from N. N. E. to E. Mt. Louro is a round hill, 787 feet high, with two peaks on its summit, the higher of which, the southern, is crowned by a watch-tower, and on its south extreme, called Queijal point, is a light-house.

Dangers.

About 5 miles W. N. W. from the above light-house is a circular shoal, about 1 cable in diameter, named the Meixido, consisting of several dangerous sunken rocks, on one of which there are only 3 feet water, but their position is nearly always pointed out by breakers. This shoal is marked by a bell-buoy and a buoy with a globe, west and east of it, but they are often swept away by the sea.

A patch of 3¾ fathoms, called the Ynsua rock, lies ½ a mile distant from the west side of the shoal, and a like patch about the same distance from the north side. The channel between the Meixido and the land is deep, clear of danger, and buoyed, but the buoys are often swept away, and large vessels should always pass outside, which may be done by keeping the Navé of Finisterre open of the cape N. by W. ½ W. until the light-house of Queijal point bears E. ½ N., when the vessel will be south of these dangers and of the Bueyes.

Nearly 3 miles W. ¼ S. from the tower on Mt. Louro are the Bueyes, large rocks that look like fishing-boats anchored together. They are low, and in a heavy sea the water washes over them. A sunken ledge extends some distance from their west side.

About ¾ of a mile northward of them lies another rocky patch, called the Mean.

The Leixon islet and rocks, off Queijal point, are large and clear on all sides except the north, where they are united to the main-land by a reef, over which the fishing-boats pass at high water.

Light: Lat. 42° 44′ 12″ N.; long. 9° 04′ 35″ W.

The light-tower on Queijal point is of light-colored granite; it is hexagonal, is 26 feet high, and adjoins the keeper's dwelling. There is a *fixed white* light displayed, at an elevation of 37 feet above the sea-level, visible 10 miles in clear weather.

Muros bay.

Muros bay, extending about 8 miles E. N. E., lies between Mt. Louro and Castro point, 3½ miles S. E. by S. On its north shore is the town of Muros, and on the south shore that of Noya, and besides these are several less important towns and villages. The shores of the bay, well peopled and highly cultivated, are much indented, and the land, to the north especially, is quite mountainous. The width of the bay varies from 2 to 3 miles from the entrance to Quiebra island, after which it narrows considerably, and terminates at the mouth of the Tambre river, which empties into it. The depth is 15 to 25 fathoms at the entrance, 9 to 11 fathoms near Quiebra island, and then rapidly diminishes to the head of the bay. The bottom is mud, sand, and gravel, with patches of rock, and there are many sunken dangers off the rocky shores.

Francisco bay.

Francisco bay, the first bight on the north shore between Mt. Louro and Bouja point, has a beach, but there are many rocks, both above and below water, close to it. The depths are convenient at a short distance off shore, but no vessel should anchor here, as the bottom is foul. In case of necessity, and for protection against winds from W. to N. E. through N., a vessel anchoring should carefully select a gravel bottom, and should weigh at the first appearance of wind from seaward.

Bouja point is high and precipitous, with a reef running some distance from it to the southward, having on its extremity, which is steep-to, only 6 feet water.

Port Muros.

About 1 mile N. E. of Bouja point is the Atalaya de Muros, a high hill, precipitous to seaward, with deep water at 2 cables out. From thence the shore bends round to the N. W. and N., forming port Muros, the head of which is shallow. This port, 1 mile wide, and 1 mile deep to the W., is well sheltered in any weather, and particularly so from winds from N. W. and S. W., which are the worst on the coast. There is good holding-ground, and the sea is never heavy, even with winds from E. and S. E., to which the anchorage is most exposed. A large vessel should anchor near the middle of the port, taking care to avoid the rocky patches of the bottom in letting go. In making this anchorage, a berth of 1 cable should be given to the coast and 2 cables to the cliffs of the Atalaya. In tacking in, the shallow bay of Bornalle should not be entered.

Muros. The town of Muros, containing 2,650 inhabitants, is built along a beach about ½ a mile within the Atalaya. There is a ruined fort and a small mole at the southern extremity, and in the town are several fish-salting establishments. There is hilly land about the shores, except on the N. W. side of the port, where the land is low, fertile, and watered by a rivulet that empties here. Mt. Galera, 1,475 feet high, is 2 miles N. N. W. of the town, and Mt. Cabazo, 1,095 feet high, and Mt. Oroso, 770 feet high, are W. and S. W. of it.

Good water and provisions are obtainable, as well as workmen and facilities for repairs.

Tides. The establishment of the port is 2h. 45m. p. m. The tide rises 11 feet at springs and 8 feet at neaps, with an increase of 2 or 3 feet with heavy winds from seaward, and a corresponding decrease with winds over the land. The tidal current follows the trend of the shore.

Bornalle bay. Bornalle bay, 2 miles N. E. of the Atalaya, has a beach, rivulet, and village at its head. It is shallow and unsafe, and exposed to winds from seaward. From thence a rocky coast runs southward ¾ of a mile to an islet surrounded by rocks, which must be given a good berth, and which is called the island of Santa Catalina. From this islet to a point about 1½ miles eastward the coast is of moderate height, with a number of large rocks and shoals stretching off in places about 3 cables. In the middle of this reach is point Inzuela, a sharp, almost isolated rock, connected with the land by a tongue of sand.

Esteiro inlet Esteiro inlet, open to the S., lies between Esteiro point and Quiebra island. It extends 8 cables N., and at its head is the rivulet of the same name. This inlet is only used by the fishing-boats. Huia point, at the east side of the entrance, is low and foul, with high land in rear. Quiebra island, a little more than 1 cable S. of Huia point, is high, with rocks extending from its N. W. and S. E. ends, the passage between it and the point being only fit for boats.

Noya inlet. From Quiebra island the bay of Muros narrows to 9 cables, and apparently retains this width to the entrance of the Tambre and Noya channels, but 1⅓ miles inside Quiebra a large triangular tongue of sand (Misela bank) projects from the south shore toward Corbeiro point, leaving between it and Corbeiro islet a channel about 220 yards wide, with a depth of 3 fathoms at low water. Mt. Tremuzo, 1,687 feet high, is 2 miles N. of this part of the bay, with 3 peaks on its summit. On the most southern and the highest peak there is a white pyramid, a surveying signal.

The cove of Freijo, north of the sand-spit just mentioned, is the port of Noya, and the village of Freijo is on the western shore of it.

The town of Noya is on the north bank of a narrow channel which passes between large sand-banks to Freijo cove. Beyond the sand-banks of the channel the land is picturesque, thickly inhabited, and well cultivated. The rivers Sierra and Tambre empty into the inlet on the north. Several villages are on their banks, and the land all about is well cultivated. Salt is brought to Noya, and salt-fish, sardines, grain, &c., exported.

Tides. The establishment at the bridge of Noya is 3h. 30m.

The bay coast. From Misela bank the coast trends about S. W. to the bay of Son. The cultivated lands reach the sea-shore and cover the undulating hillocks as far inland as the slopes of Mt. Barbanzo.

Plancha point, 1 mile from the S. W. limit of Misela bank, is high and projects but little, with 4 fathoms water near it. Cabeiro point, 2⅜ miles farther on, is high, broad, and projecting; on its summit are three hills, called Alto de Cabeiro, and 298 feet high. About 3½ miles E. of this point is the peak of Tanagueiro, 1,910 feet high, the most northern mountain of the Barbanzo range, which lies almost parallel to the coast.

On the west side of Cabeiro point is the beach of Polveira, which terminates in a low point nearly ½ a mile westward, from which a reef extends ½ a mile to the N. W., and at low water a large rock, named Filgueira, appears in the middle of it.

Between the low point and the Atalaya de Son, the next point westward, the shore is a beach with several rocks off it, some of which are visible at low water. The Atalaya de Son is a hill of moderate height, dark-colored, and precipitous, with a chapel on its summit, the only building of the character on the south shore of the bay.

Close to its east side is the town of Son, where a mole incloses a little basin accessible at high water, that is sheltered from the heavy N. W. sea by a reef west of it. The point and coast are skirted by reefs extending about 1½ cables off shore.

The shore from here to Castro point, 2¼ miles to the S. W., is skirted by rocks. Castro point is of moderate height, perpendicular, dark-colored, and foul.

Baya bank and Con rock.

At 1⅓ miles W. ¼ N. from the point, and 2⅔ miles S. by E. ½ E. from the light-tower on Queijal point, is the middle of a reef of rocks called the Baya, nearly awash at low water. They extend a short distance to S. E. and E., and the water breaks on them in a heavy sea. They are marked by a globe buoy.

Nearly midway between this reef and Castro point is Con rock, under water, between which and the ledge off the point is a narrow channel, with 13 fathoms water, used only by coasters.

Basoñas bank.

The extensive Basoñas bank may be mentioned here, as it lies in the track of vessels approaching Muros bay from the southward. The largest rock on the bank is like a sloop's hull, having other smaller rocks around it. From the center of the bank the light-house on Queijal point bears N. ½ E. 5¾ miles, Castro point N. E. ¼ N. 4¼ miles, and Caresiñas point S. E. ½ E. 2¼ miles. There are 7 fathoms close to the east side of the bank and 14 fathoms on its west side. At low water other rocks are uncovered or awash, and with a heavy sea the water breaks over the whole bank.

Directions.

Entering Muros bay with a fresh wind, vessels should avoid the southern shore and approach Mt. Louro. If bound for Muros, give a berth of 3 or 4 cables to Bouja and Atalaya points, and after doubling the latter moor off the town in 9 to 11 fathoms, mud.

In taking this course, look out for the squalls that sweep down from the heights of the Atalaya and the neighboring mountains during S. W. and W. winds. At the anchorage these squalls are not felt.

Working in against head-winds, when on the S. E. board, do not pass the alignment of Lens point with the peak of the Faro that crowns Remedios point until the Baya rocks are passed. Farther in, when between Muros and Cabeiro points, anchor if necessary, remembering that from the southern shore to mid-channel the bottom is rock and gravel, while on the other side it is mud.

If the wind be from the S. or S. E., keep the southern shore aboard, avoiding the Basoñas, and pass outside the Baya reef by keeping the light-house on Queijal point northward of N. by W. until Cabeiro point bears N. E. by E. ¼ E.; then steer for the anchorage.

In going to Noya, vessels should always take a pilot if not familiar with the Misela channel.

Landmarks.

Coming from seaward, the best landmark is the long Barbanzo mountain, near the south coast of the bay, with the high peaks of Fanagueiro and Garota, and on nearer approach Mt. Louro.

Coming from the north, capes Toriñana and Finisterre are sufficient guides, shaping a course from the latter to clear the dangers before described.

Coming from the south, after clearing the dangers which lie N. W. of Salvora island, either keep along shore, passing inside of the Basoñas, or head N. until on their parallel, when steer for Mt. Louro.

At night the Louro light and that of Corrobedo, being both *fixed*, may be mistaken for one another. The best approach then is from seaward, steering between Corrobedo light, *fixed*, and Finisterre light, *revolving*, until Louro light is recognized. In approaching from any direction this latter light should be kept between the bearings of N. by E. ½ E. and E. by N. ½ N., between which there are no dangers.

Pilots.

There are licensed pilots at Muros, who may be signaled by hoisting a flag at the fore. They usually go out, when the weather allows it, west of Mt. Louro, and they carry a flag in their boats.

Coast. From Castro point, on the south side of the entrance to Muros bay, the coast trends 7½ miles S. S. W. to cape Corrobedo, and is backed at a short distance inland by the lofty mountain or range of Barbanzo, with the remarkable peaks of Fanagueiro (1,910 feet) and Curota (2,041 feet) at its extremities. Between Castro point and Roncadora point, the next projection to the southward, the shore is low, with rocks and shoals off it as well as about the latter point, which is high and steep like the former. In this bight are two fine beaches backed by fertile lands, and coasters occasionally anchor here in N. E. winds when they cannot fetch Muros bay.

From Lago point, ½ a mile south of Roncadora, as far as Caresiñas point, 2½ miles S. S. W., which is low and rocky, the shore is low. From the latter point a tongue of sand projects to N. W., uncovering for 3 cables at low water, and at its extremity is a rock always uncovered. Taume lagoon lies nearly a mile inside the point, and there are a few rocks off the beach.

Espiñeiria point is 1¼ miles S. W. from Caresiñas point. The shores of the bight between are low and unsafe, rising a mile inland to form Mt. Taume, which slopes to the S. W. and terminates in Mt. Facho, a peak neither so high nor so sharp-pointed as the former. Espiñeiria point is low and rocky, with a reef extending from it about 3 cables N. W., and there is also a rock, called Teilan, lying about ½ a mile W. ½ S. from it, with a depth of 9 fathoms between. The Basoñas bank, nearly N. of this point, has already been described, (page 83.)

Cape Corrobedo, nearly 1½ miles S. S. W. of the latter point, is low, salient, and surrounded by rocks, but will be easily recognized by its light-house. The bight between is shallow and unsafe. Mt. Facho, 426 feet high, stands 1½ miles N. E. by E. from the light, and is of a whitish color for half its height.

Between the cape and Falcoeiro point, 4¼ miles S. S. E., is a large bay with a flat beach, skirted here and there with large rocks. As far as the beach the shore is high and rocky, and bordered by a reef, and beyond the beach to Falcoeiro point it is again of moderate height and steep, but of a sandy color. On the west side of the little bight, just inside of the cape and on the southern slope of Mt.

Facho, is the village of Corrobedo, and 1½ miles farther east is the mouth of the river Mar, the outlet of a lagoon, 1 mile inland, which is fed by the water-courses of the Barbanzo range. A thick group of rocks lies off the mouth of the Mar.

This bay has anchorage in 11 fathoms water, sand, sheltered from N. E. winds. It is necessary to anchor with a long scope, on account of the heavy swell. It is occasionally used by coasters, but off its entrance are dangerous ledges, steep-to, on which the sea breaks when there is any swell. The outermost ledge, named Pragriña, lies S. S. W. ½ W. 2½ miles from cape Corrobedo, and between are four others, named Cobos, Tomasa, Rinchador, and Marosa, with deep water between them. About 2½ miles S. E. ¼ S. from the Pragriña is the Canteiro, the outer of three other ledges—the other two being named Pragueira and Dianteyra—lying nearly 2 miles westward of Falcoeiro point.* At 1 mile W. S. W. from the Pragriña there is also a 9-fathom patch.

Off the latter point lie some islets and rocks, which, with the large rocks off the northeast part of Salvora island, resemble from a distance a number of vessels under sail. The most remarkable of these are Sagres island, 3½ cables S. S. W. from the cape, and Falcoeiro islet, closer in shore. Sagres island is nearly surrounded by a reef, and between it and the rocks off the coast is only a boat-channel. Forcadiña and Meijon shoals are E. and S. E. of Sagres.

Salvora island, 2½ miles S. S. E. of Falcoeiro point, is about 1 mile long, N. N. E. and S. S. W., of a reddish color, high in the middle, but low at each end, particularly the north From the N. E. to the S. points through W. a reef and chain of rocks extend around the island, reaching 1 mile N. and N. W. and about 3 cables S. W. A light-house stands on the south end of the island.

Lights: Lat. 42° 34′ 38″ N.; long. 9° 04′ W.

The light-house on cape Corrobedo stands about 1 cable S. S. E. from the extremity of the cape. It displays, at an elevation of 103 feet above sea-level, a *fixed white* light, visible 15 miles in clear weather.

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* There is a bank with 13 fathoms over it 6½ miles W. ¼ S. from cape Corrobedo. The fishermen say that one hummock of this bank has only 6 fathoms on it, but in a search made by a Spanish officer in 1866 this could not be found. A 7-fathom patch is reported 2 miles W. N. W. from the cape.

The light-house of Salvora is built on the point of the island projecting farthest to S. W. It displays, at an elevation of 82 feet, a *fixed white* light, varied by a *red flash* every 2 *minutes*, visible 12 miles in clear weather. Lat. 42° 27′ 50″ N.; long. 8° 59′ 50″ W.

This latter light-house is the best landmark for Salvora island, as the island itself is often confused with the land beyond.

Rocks and shoals. The Lage de Salvora, a rock always uncovered, is the N. W. extreme of the shoal N. of Salvora island, and lies above water, 6½ cables N. W. of the northern point of the island. This and the buoy on Meijon bank show the entrance to the N. W. channel to Arosa bay. The channel is about 6 cables wide, with a depth of 9 to 16½ fathoms.

From a point 1½ miles E. by N. of Falcoeiro point a reef 7 cables long runs S. by E. On this reef is a large flat rock, named Centolleira Grande, and at the extremity of the reef is a group of small isolated rocks above water, named Centolleira Chica, immediately south of which the N. W. channel passes. A buoy is anchored by these latter rocks, but it is often carried away by the sea.

The Sargo rocks, Vionta island, flat and sandy, and Noro island, cone-shaped, with a number of surrounding rocks, form a triangular bank N. E. of Salvora island and S. of the Centolleira Chica, forming, with the latter, the N. W. channel. Between this bank and Salvora there is a deep, but sinuous and dangerous channel.

Anchorage. Vessels entering the bay of Arosa sometimes anchor under the lee of Noro island with a N. E. wind, or 1 to 3 cables from the beach on the east side of Salvora island with winds from S. W. to N. through W., but should weigh as soon as the wind lulls, as these banks and islands make a very dangerous lee-shore.

Arosa bay. Arosa bay is an extensive inlet, running about 15 miles to the N. E., with a varying width of 3 to 8 miles, having its entrance between Falcoeiro point on the N. W. and the Grobe peninsula on the S. E., distant 5¼ miles from one another. Between the two points of entrance and S. W. of the line joining them are Salvora island and the surrounding banks already described, almost joining Falcoeiro point, but leaving one or two small channels. These islands and shoals form a barrier which breaks the heavy sea and protects the anchorages inside.

Between Salvora island and the Grobe peninsula is the largest and best channel, 2 miles wide, with muddy bottom and a depth of 16 to 29 fathoms.

The island of Arosa and many small islets and rocks are scattered about within the bay, and there are many reefs running off from the points and islands, but the navigable channels leading to the principal anchorages are sufficiently clear to enable the prudent mariner, with a good chart, daylight, and a leading wind, to take his vessel safely in. In the middle of the bay any class of vessel can tack with safety, and there is good holding-ground and safe anchorage even in the channel. The numerous banks and shoals are some buoyed, some distinguished by easy landmarks, which will be given farther on, and others easily recognizable by the color of the water or by a kind of seaweed (called by the inhabitants of this section *golfeiras*) which grows on them, sometimes attaining a height of 8½ feet.

The shores of the bay are much indented, backed by mountains separated by magnificent valleys, well populated and highly cultivated. Several cities of importance are built here, and at the head of the bay empties the Ulla river, which separates the provinces of Coruña and Pontevedra.

To commence with the north shore of the bay: from the point terminating in the Centoleira chain of rocks, the coast trends N. E. by E. 7 cables to point Castro, and thence 1 mile N. E. to Ayro point. Off the coast, between these two latter points, lies Castro bank, extending 1 mile S. E. of Castro point and 3 cables E. and S. E. of Ayro point. Between this bank and the Centoleira is the town and port of Carreyra.

Santa Eugenia bay. Between Ayro and Grades points, 2 miles N. N. E., the coast takes a deep bend, forming the bay of Santa Eugenia. The best anchorage is 2 or 3 cables from the beach in the N. angle of the bight in 4½ to 5½ fathoms water, mud and sand, good holding-ground. Care must be taken to avoid the ledges in the middle of the entrance and one about 3 cables E. from the town and N. E. of the last of the high shore-line. The town of Santa Eugenia, containing 2,300 inhabitants, is on the west side of the bay, with a small mole at the southern end of the town. At 2 cables N. E. of the mole is an islet about 1 cable long.

This anchorage is rather unsafe in winter, as with strong east winds the surf shifts the sand, and there is danger of dragging on shore. In summer, with strong east winds, it is sufficient to anchor in the north part of the bight near the beach.

This bay is often used by vessels leaving Arosa bay bound N. when the wind is unfavorable for doubling cape Corrobedo.

Water may be obtained here, but few provisions.

Mount Alberto, 664 feet high, is about 1 mile N. by W. from Santa Eugenia, and has a chapel on its summit, and Mt. Del Castro, a lower hill, is nearer the town.

Carniceira shoal and Camonco rock lie about 1 mile S. S. W. from Grades point in the middle of the entrance.

Palmeira cove.

Palmeira cove lies between Grades and Corna points, 1⅛ miles apart. It is unsafe on the western side, but has good anchorage on the east side in 4½ fathoms water, mud. The town of Palmeira, at the head of the cove, contains 1,300 inhabitants.

Dangers.

Grades point is surrounded by a reef, on the edge of which are several islets and rocks.

Off Corna point, as well as off each of the two points immediately east of it, there is a smaller reef and rock.

The Sinal rocks are a short mile S. E. by E. from Corna point and 1⅖ miles N. N. E. from Rua island. They are partly uncovered at low water, and there is shoal-water near them.

The Col de Mastes is a small rocky shoal, with 1¾ fathoms of water over it. It lies ⅚ of a mile E. S. E. ½ E. from Grades point, in line with the Lobeira Grande and the middle of Salvora island.

The Lobeiras are two groups of rocks lying to the northwestward of Rua island, about 4 and 6 cables distant. The larger group is always uncovered, while the smaller, Lobeira Chica, only dries at low water. There is a boat-passage between.

Rua island lies 2 miles E. N. E. ½ E. from Ayro point, in the middle of the channel leading to the head of the bay. It is barren, rocky, and of a whitish color, with deep water all around it. Pedregosa island lies E. S. E. ½ E. of it, and between them is a channel 7 or 8 cables wide, with 35 fathoms water. This is the channel generally used, but vessels may also pass between Rua island and Lobeira Chica, keeping nearer the island.

Light: Lat. 42° 32′ 50″ N.; long. 8° 55′ 26″ W.

On Carabeliña point, Rua island, there is a cylindrical gray tower with white lantern, 52 feet high, which displays, at an elevation of 78 feet above sea-level, a *fixed white* light, visible 11 miles in clear weather. The tower adjoins the keeper's dwelling, which is also gray.

From Corna point the coast forms a bluff promontory projecting to the eastward. Off the N. and S. points of the head of the promontory lie the islets and shoals of Ingua, ⅔ of a mile E. of the S. point, and Ostreira, ⅓ of a mile E. of the N. point.

Caramiñal bay.

Between this promontory and Chazo point, 3 miles E. N. E. ¾ E., lies a large bay, the western bight of which is known as the bay of Caramiñal. On the shore of this little bay are the towns of Caramiñal and Dean, adjoining. The only danger in the bay is a shoal with 1¾ fathoms water on it, lying ¾ of a mile N. W. of the N. point of the promontory and about 3 cables off shore. Two rivulets empty into the bay, which is sheltered from all winds, and large enough to give anchorage to a large number of vessels. Even in winter, and with winds from E. to S. E., little sea is raised, and vessels are in no danger if the easterly moorings are doubled. There is excellent holding-ground of clayey mud. Pilots may be obtained here for all the bay of Arosa. Provisions and water are abundant.

Tides.

The establishment is 3h. p. m. The tide rises 11 feet, with a little increase during easterly winds.

Landmarks.

The more remarkable landmarks in entering Caramiñal bay are the convent of San Francisco, standing alone on Raposiña point, the large dark-colored church of Caramiñal in the center of the town, and the castle of Junqueira.

Barraña bay.

The northern part of the bay of which Caramiñal is the western bight is named Barraña Bay. For about 2 miles from Caramiñal beach the shore is bluff and skirted by reefs; so it should be given a berth of 3 or 4 cables. Then comes a large fine beach, extending all around the head of the bay, after which a much-indented shore trends south and then east to Chazo point. The anchorage is between port Esteyro and Trabe point, in 5½ fathoms water, mud.

It is well sheltered in summer from winds from N. W. to S. E. through N., but is somewhat unsafe in winter with the contrary winds.

At the villages of Cruz and Estero there are small basins, inclosed by moles, which dry at low water. Other villages are scattered along the shore, and some lie at some distance inland.

From the west point of the little promontory terminating in Chazo point a reef extends nearly 1 mile S. W., inside the extreme of which is Benencia island, then the Baos islets and a number of rocks. The channel between Benencia and Arosa islands is about 15 cables wide, with 23 fathoms in the middle, shoaling to 9 and 13 fathoms near Arosa and 2¾ fathoms near Benencia.

Barsa rock is dangerous, as it only uncovers at low water. It lies nearly 4 cables S. S. E. from Chazo point, in line with this point and the watch tower of Ancados. There is a buoy anchored near it in 3 fathoms. There is deep water on both sides of the rock.

Rianjo and Bodion bays.

Between points Chazo and Portomouro the coast forms a shallow, unsafe bight, nearly 2 miles across, the latter point bearing about N. N. E. from the former.

From Portomouro the coast turns sharply to N. W. and sweeps around to Fincheira point, 1¼ miles N. E., forming Rianjo bay, the western bight of which is called Bodion bay, on the shores of which are several villages.

Rianjo bay, 2 miles wide and 1½ miles deep, has a depth in the middle of 2¾ fathoms, diminishing regularly to the banks which skirt the shores. The bay is admirably protected from all winds and from the sea. The best anchorage for vessels of moderate draught is in 2¾ fathoms water, mud, ½ a mile west of the town of Rianjo.

This town, 3 cables N. of Fincheira point, has 2,000 inhabitants. W. and N. N. W. of the town, extending about 3 cables from the shore, are several islets and rocks, the one W. of the town having a hermitage on it. The Meluzo river and another stream empty into this inlet, which is the most northern of Arosa bay. At 6 miles N. N. E. of Rianjo is Mount Treito, 2,227 feet high.

Padron inlet.

From Fincheira point 1 mile S. E. to the entrance of Padron inlet there is nothing remarkable about the coast.

Padron inlet is that part of the Padron or Ulla river between the mouth and the bridge of Cesures, which is all the navigable portion of the river at high tide. The river rises in the province of Lugo, separates the provinces of Pontevedra and Coruña, and is the third in importance in Galicia. The bar of the river is between Cortegada island and Porron point, 1 mile apart, the inlet extending 10 miles in a northeasterly direction. The bar is variable, and beyond the entrance the channel contracts so rapidly that abreast of Bamis it is only 1 cable wide, narrowing beyond to a boat's length. Though the sand of the bar is very light, the depth does not vary much, as there are no heavy freshets in this river. Only vessels drawing about 6 feet can pass up the river to Cesures or Bacariza.

The town of Padron, of 8,000 inhabitants, is on the left bank of the river where the Sar river joins it. The tide is felt for half a league above the bridge of Cesures, where high tide is 35 minutes later than at Villagarcia. In spring-tides the current is 2 miles and in neaps 1 mile per hour. In freshets the ebb is swift and the flood has no current.

Cortegada island. Cortegada island, which forms the southern limit of the mouth of the Padron river, is connected with the coast by a reef of sand and rocks, on which are some oyster-beds. This reef uncovers at low water. The island, 6 cables long and 3 wide, is low and covered with villas and gardens.

The town of Cortegada is on the south side of the island, opposite Carril, and vessels anchored at the latter town water at the former.

San Bartolome is an islet a short distance from the S. W. end of Cortegada. It is surrounded by a group of islets and rocks extending farther west, terminating there in Briña islet. This group must be given a berth of 4 or 5 cables in going to Carril.

Port Villagarcia. This bay, between Cortegada island and Sines point, is 2⅗ miles wide and 1½ miles deep to the east, with the towns of Carril, Villagarcia, and Villajuan on its N., E., and S. shores.

Carril. The first of these numbers 2,000 inhabitants, and is of considerable commercial importance. The mole can accommodate half a dozen vessels, drawing 7 or 8 feet at low water. Carril is the port of Santiago, and imported articles are transported there by way of Padron.

The anchorage is between the town and the southern point of Cortegada, in 11 to 14 feet water, large vessels mooring farther out in 5½ to 6½ fathoms, laying the anchors N. W. and S. E. There is a rock 3 cables S. by W. from the mole, marked by a wooden pole. Inside the mole is an excellent beach for careening vessels by taking advantage of the tide. Provisions and water are abundant.

Mt. Xiabre, 3½ miles E. N. E. ½ E. from the town, is 2,209 feet high. Standing alone on the east side of the bay, it is easily recognized by its round summit, dark color, and gentle slopes.

Villagarcia. This town is situated at the foot of a hill on the east shore of the bay, and is surrounded by cultivated lands. It contains 1,900 inhabitants, and is the capital of the maritime province of the same name. Two small streams empty east of the town, which are navigable for boats at high tide for some distance.

There are few good landings in the bay, as the sandbanks uncover all around it at low water. The best anchorage is in the northeast part, abreast of Villagarcia, where 20 or 30 vessels, not drawing more than 13½ feet, can lie perfectly sheltered from all winds, in 2¾ fathoms water, mud. The anchors are usually laid N. and S. Any number of larger vessels can anchor farther out in 3 to 3¾ fathoms, mooring N. W. and S. E.

Villajuan. The town of Villajuan is S. W. of Villagarcia, on the S. E. shore of the bay, numbering 1,000 inhabitants. At about 1¾ miles S. E. by S. from the town is the peak of Olibeira, 970 feet high, with a sharp-pointed summit, and barren.

Villajuan is on a little cove with a continuous beach, and has a small basin inclosed by the mole, which dries at low water. There is a small reef extending W. and N. from the point north of this town, terminating in a rock about 3 cables distant from the point, and S. E. of the islet of San Bartolome there is a shoal with 1¾ fathoms on it.

Tides. The establishment at Villagarcia is 3h. The tide rises 13½ feet at springs and 8 feet at neaps. With gales from S. W., W., and N. W. there is an increase of 1½ feet, and with N. E. gales a corresponding decrease.

Villanueva. From Sines point the coast trends 1 mile S. by W. to the town of Villanueva de Arosa, on the north shore of an inlet of the same name. At the head of this inlet, which is dry at low water, empties the rivulet of Carras, which rises at the peak of Olibeira. The population of the town is 800. The steeple of the church of Villanueva commences to appear as a vessel enters the channel between Benencia and Arosa islands. The anchorage is between the latter island and the town, in 4½ to 5½ fathoms water.

Dangers. There are several shoals off this portion of the coast between Sines point and Arosa island.

The Novias are dangerous peaks of a rocky ledge, 8 cables W. by S. from Sines point, with 5½ feet of water over them. The disturbed water always marks their position, and serves as a guide to clear the Lobeiras, 2 cables farther north, which uncover only at low water.

Arosa island. Arosa island, in the middle of Arosa bay, is very irregularly shaped. It is 3 miles long N. and S., and of varying width, in some places not being 1 cable across. The coast is steep and unsafe, forming numerous bights and beaches, with many scattered rocks and reefs. There is a barren hill, 164 feet high, in the N. W. part of the island. Barbafeita point, the N. W. point of the island, is low and salient, and terminates in a reef which ends in a rock 3 cables off the point, where the steamer Ter was wrecked in 1858. This rock has 2 fathoms water on it, and is 3 cables N. W. by N. from the point. A buoy is anchored outside of it, but is often swept away.

The west coast of the island forms several bights and inlets, the largest being just S. of the town of Arosa. Off this inlet is a rock under water, named Lage de Xam, with deep water around it. It lies 1 mile S. by E. ¼ E. from Barbafeita point.

The southern end of the island is prolonged by a reef jutting toward Grobe peninsula, and on which are several rocks above water. Those easiest seen are the Mesa, which is flat, black, and 2 cables S. of the S. W. point; Gallinero, 4 cables S. of the S. point of the island, and Cambados, nearly on the southern extreme of the reef. This reef forms, with the Grobe peninsula, the southern entrance of the channel separating Arosa island from the east shore of the bay. The channel itself is closed at low water by Bado bank, which stretches across from the middle of the east coast of the island to Bado point. The greatest depth in the channel is 7 fathoms.

Light: Lat. 42° 34′ 08″ N.; long. 8° 51′ 58″ W.

There is a light-house 20 feet high on Cabalo point, one of the north points of the island, which displays, at an elevation of 36 feet above the level of the sea, a *fixed white* light, visible 10 miles in clear weather.

Anchorages.

There are two principal anchorages about Arosa island, one east of the town and the other west of it. The eastern anchorage is a cove open to N. E., where vessels anchor, about 3 cables from the beach, in 9 to 11 fathoms water.

The western anchorage is about 7 cables S. of Barbafeita point, in 15½ fathoms water, mud, good holding-ground. This anchorage is between the northern part of the island and the large rocky bank west of Arosa, which will be described farther on.

Dangers.

There is a large plateau of rocks and islets west of the middle of Arosa island. It extends 1½ miles E. and W., and its breadth varies from 5 to 12 cables. The most noticeable features of the bank are Pedregosa islet, near its western extremity, and Arenosa islet, in the middle. The former is composed of blackish rocks, with patches of sand and grass. It has several rocks around it, one of which, N. W. from the island, is on the extremity of the bank. This rock is marked by a buoy N. W. of it, which is often carried away.

Loba rock uncovers at low water, and is 8 cables S. of Pedregosa, on the S. W. extreme of the bank. This is to be marked by a buoy.

The Camallones rocks are at the southeastern limit of the bank, forming, with Arosa island, a little channel with a depth of 11 feet. There is a depth of 7 to 23 fathoms all around this bank, except on the east side.

Mesos rocks, about half way between Pedregosa islet and San Vicente point, Grobe peninsula, are covered by 1¼ fathoms water.

Finally, between the Mesa and Gallinero rocks, in the reef south of Arosa and the N. E. head of the Grobe peninsula, are four rocks, two of which uncover at low water. Coasters pass on both sides of these rocks in 2 to 7 fathoms water.

Combados inlet.

Between Bado and Tragrove points the coast is lined with beaches and skirted by numerous rocks, which show at low water. Off Portofranco point is the Abilleira rock, which uncovers at low water. There is a depth of 11 to 14 feet between this rock and the shore. Point Tragrove is the northern limit of Combados inlet, which extends for 7 cables N. E. It is much obstructed by banks, dry at low water, which render the navigation of the inlet very difficult.

A town of the same name is on the shore of the inlet. It contains 1,000 inhabitants, and there is a convenient mole there, which is dry at low tide.

Large vèssels cannot near the beach, and anchor 1 mile out, and 3 cables S. W. from Tragrove point in 6½ to 7½ fathoms, sand. The anchorage is well sheltered from wind and sea, with some current from the different channels. The best anchorage is between the point and the easternmost of the Meanas banks, which uncover at low water. Coasters going nearer the town should take care to avoid a rock named Pedriña and other shoals near the beach.

The town of Fefiñanes adjoins Cambados on the north. It has about 700 inhabitants, and there is a mole for small boats off the town. A brook empties here. There are several rocks between this and Tragrove point, lying about 2 cables off shore, and some of them always covered.

Grobe bay.

Grobe bay is comprised between the peninsula and the eastern bay shore, extending for 3 miles S., with a breadth of 1 to 2 miles, and terminating at the isthmus of Grobe. The shores of the bay are composed of marshes and low-lands, intersected by narrow channels leading to different villages and salt-works. The entire bay is obstructed by sand-banks uncovering at low water, the channels carrying from 3 to 11 feet water only.

There are several islands that cannot be reached by boats at low water. The largest, Toxa island, is 1 mile long N. and S. and ½ a mile wide. This can be reached at low tide on horse-back. It is almost without vegetation, but has some importance on account of the medicinal springs and baths at its southern end.

East of this is a smaller islet, almost in one with the coast at low water. Between the two islands is a narrow channel, and farther in are other islets, rocks, and banks.

In the eastern part of Grobe bay is Humia inlet, where a brook empties that cuts a channel through the sands. This rivulet has a swift current during the rainy season, and its washings contribute largely to form the banks that encumber this part of the bay.

Grobe peninsula.

Grobe peninsula, the southern limit of the entrance to Arosa bay, is very irregular in surface and contour. It is 4 miles in extent E. N. E. and W. S. W., and about 2 miles wide, and is united to the main land by a narrow, sandy isthmus. It is a mass of granite covered with a light layer of earth. The main channel of entrance to the bay is between the western head of the peninsula and Brisans point, Salvora island.

San Vicente, the N. W. point, is unsafe and surrounded by rocks, which extend 3 cables in every direction, the Pombeira and Pombeiriña rocks lying farthest N. W.

From San Vicente point the coast trends E. and N. E. to Frijon point. It is chiefly high, steep, and skirted with rocks. On Ledeira point is the village of the same name; and from Frijon point the coast trends N. E., E., and S. E., with occasional rocks near.

The town of Grobe is scattered along the N. E. face of the peninsula, and contains 1,300 inhabitants. The reefs near the coast here do not allow vessels to approach very closely.

Salbores rocks.

Salbores rocks form a reef 3 cables long N. and S., which uncovers at half tide. The center of the reef is 1 mile N. by W. from Ledeira point. This danger is in the track of vessels bound for Cambados, after doubling San Vicente point, and may be avoided by bringing the north point of Grobe peninsula to bear a little S. of E.

Directions.

The only clear and safe channel for entering is between Salvora island and the peninsula and between Rua and Pedregosa islands. In gloomy weather, when objects cannot be well distinguished, steer for Salvora island until 3 or 4 cables from Brisans point; thence head N. N. E. ¼ E., to pass east of and close to Rua island, and then steer N. E. ¾ N., to pass midway between Barbafeita and the opposite point.

In going to Carril, when the city is in line with the peak of Xiabre, about E. N. E. ¼ E., this as a course clears all dangers until the rocks and shoals at the entrance of the bay are reached. Give these latter a good berth and steer for the anchorage of Carril or Villagarcia.

In going to the eastern anchorage of Arosa island, after passing the buoy of Ter rock, round the island at about 3 cables' distance, and anchor N. and S. with the town.

In going to Caramiñal or Barraña, when abreast Ingua steer direct for the Baraña anchorage, abreast Esteyras, or head more to the westward, leaving the Ostreira buoy to port, and then steering for the church of Caramiñal until the anchorage is reached.

In going to Rianjo or Padron inlet, proceed as in going to Carril until Chazo point is in line with the watch-tower of Ancados; then steer N. E. ½ N. for Porron point, the N. W. point of entrance of Padron inlet, until San Bartolome islet is in line with Villagarcia, when head for either anchorage or the bar.

For the western anchorage of Arosa island, when the north part of Arenosa is in line with the south part of Arosa island, head in for the anchorage south of Barbafeita point.

To go to Santa Eugenia bay from abreast Brisans point, steer N. by E. until Ayro islets bear W. by S. 3 or 4 cables distant; thence steer N. N. W. ¾ W., and anchor near the north beach. It is better always to pass to the southward of Camonco rock.

Finally, to go to Cambados from abreast Brisans point, steer N. N. E. ¼ E. until Ayro point and Mt. del Castro are in line; then steer E. with Mesa rock a little on the port bow. When 2 cables S. S. W. of this islet head S. E., keeping the last rock on the reef a little open on the port bow, so as to pass it at 1½ cables, and when south of it steer for Fefiñanes, the town adjoining Cambados on the north. The southern channel between the Mesos and Salbores, &c., should not be attempted unless the captain is familiar with the landmarks.

Pilots. A pilot may be obtained by hoisting a flag at the fore or firing a cannon. There is a special pilot for Santa Eugenia bay.

Tides. The establishment at all the ports in the bay is about the same, 3h., the tides being advanced or retarded by sea or off-shore winds. High springs occur at 2h. 30m. in the ports near the entrance. The highest rise is 14 feet, the lowest 8 feet.

Landmarks. Vessels from the south have a good mark in the Cies islands, high and oddly shaped, and afterward in Salvora island. Vessels should pass 3 miles from the Cies islands, to clear the dangers near them.

Coming from the north, a berth of 5 or 10 miles should be given to cape Corrobedo, according to the state of the sea. When the cape bears N. E., steer for Salvora light, giving the island a berth of 4 cables.

Coming from seaward, first the Barbanzo range, then the peaks east of the bay, and finally Salvora island will appear. In heavy weather a vessel should keep a little to windward of the entrance in approaching, on account of the currents.

At night the lights of Finisterre, Corrobedo, and Cies are good guides until Salvora light is recognized.

Barrosa bay.

The isthmus connecting Grobe peninsula with the main-land is about 1 mile long and 1 mile wide at high tide. The south coast of the peninsula forms, with Fagilda point, 3¼ miles S. E., Barrosa bay, which is 1½ miles deep to N. E. There is a depth of 12 fathoms water, sand, in the middle of the bay, and vessels sometimes anchor here for temporary shelter from the east winds. Aguieira rock, awash at low water, is in the northern part of the bay, 4 cables from the shore, and Corzan rock is about 6 cables N. W. ½ N. from Lanzada point. This rock is never uncovered, and, as it does not break in calm weather, is dangerous. There are some little islets just off Lanzada point.

Coast.

On the little peninsula, Lanzada point, there is a hermitage. Between this point and point Corbeiro the coast forms a little bight open to N. W., and off the latter point is a steep islet surrounded by rocks, the commencement of Fagilda bank, which extends along the coast to Fagilda point, off which it projects more than half a mile to the westward. This bank forms, with the reefs of Ons island, the northern entrance of Pontevedra bay. This channel is to be buoyed.

Ons islands.

The Ons islands, lying off the entrance of Pontevedra bay, form a natural breakwater, which greatly reduces the heavy sea raised by N. W. gales. The largest island of the group is named Ons; it is 2⅚ miles long N. N. E. and S. S. W. and 7½ cables wide. The eastern side is straight and safe, while the western is higher, crooked, and closely skirted by rocks. The summit is tolerably regular, the greatest height not exceeding 487 feet. From seaward it is hard to separate from the main-land. There are several olive-groves and farms on it, and there is a fish-salting establishment on the east coast near Cans beach, and near this, 4 cables farther south, there is a hermitage. Centolo point, the north extreme of the island, is a hill 289 feet high, with a round summit, and the most projecting point to the westward. About the middle of the island is Freitosa point, off which there are at a short distance two small, steep islets.

On the eastern side are two small beaches, named Cans and Mellide, and at 2 cables from the latter, which is farther south, there is a depth of 8½ fathoms. Between the two is a ruined fort on a bluff, and near the fort there are some farm-houses and a light-house.

Vessels anchor between the two beaches and 4 to 5 cables off shore, in 13 to 14 fathoms water, sand and shells. This is a convenient place to get under way should the wind shift.

Light: Lat. 42° 22′ 30″ N.; long 8° 55′ 06″ W.

On the most elevated portion of the island, and nearly at the center of it, about 12 cables from Centolo point, there is a light-tower, with the keeper's dwelling adjoining. This displays, at an elevation of 421 feet, a *fixed white* light, varied by a *flash* every 2 *minutes.* The tower is circular and octagonal, is white, and makes a good landmark.

Onza island.

Onza is a small round island, 364 feet high, separated from the south end of Ons by a channel not half a mile wide, which is only used by fishing-vessels, as there are rocks and shoals in it. From the south point of Onza, Galera reef extends 2 cables S., and uncovers at low water. With a heavy sea this reef should be given a berth of 3 to 4 cables.

Dangers.

Off Centolo point there is a reef and a small islet, and between this and Fagilda bank there are several rocky patches, including Travesa, Camucos, and Picamillo banks, and Robalos shoal. Between these dangers there are channels which are used by vessels locally acquainted in fine weather, but when there is much swell the sea breaks all over them.

Zacharias bank, covered with 6 fathoms water, lies 1⅕ miles N. W. ¼ N. from Centolo point. The depth is from 10 to 12 fathoms all around it, and the sea breaks on it when there is much swell. This bank is in line with Centolo hill and mount Magdalena.

Loba bank is the name of the reef surrounding the south point of Ons island.

Monteseco bank lies 1¼ miles S. W. by W. ¾ W. from the south point of Onza island, with 4½ fathoms water on it.

Menguella bank is 4 cables S. of Monteseco bank, with 9 fathoms water over it. The sea breaks constantly on Monteseco bank in rough weather.

Pontevedra bay.

The entrance to Pontevedra bay is between the points of Fagilda and Udra, distant 5 miles from one another N. N. W. and S. S. E. It extends for 7 miles N. E., with a width varying from 2½ miles inside the entrance to 1½ miles abreast Marin. After this the width and depth diminish until the bay terminates in a bank at the mouth of the Lerez river.

There are many good anchorages in Pontevedra, sometimes called Marin bay, and these are protected by high spurs of the hills which form points and bights with good beaches. Between Fagilda point and Montaloo point, 1½ miles S. E., there is a large bight, with a beach and stream, all named Fagilda or Magor, protected by the islands from S. W. gales.

A rocky patch, called Cabezo de Montaloo, lies about 1½ cables S. of Montaloo point, with 2¼ fathoms water on it and deep water between it and the point, which is high and steep.

Between this and Cabicastro point there are two small unsafe bights with beaches, and less than 1 cable S. of Cabicastro point there is Elmo rock, awash at low water.

Siamo or Rinchela point, 5½ cables E. N. E. from Cabicastro point, is high and steep, and appears an island at high tide, a cut separating it from the coast. This island-like point is a good landmark.

Between this point and Fertiñanzo point, nearly 2½ miles farther east, the coast forms a deep bight, in which are several coves and two towns, Portonovo and San Genjo, near each of which a rivulet empties. Portonovo numbers 550 inhabitants, mostly fishermen, and 1 mile inland, nearly north of the town, is the church of Santa Maria, a landmark to clear the banks of Fertiñanzo. San Genjo is about the same size. It has a beach on each side, and beyond it the coast is a succession of beaches and rocky points. Near the shore are several shoals and rocks.

Anchorage.

The best anchorage for large vessels is about the middle of the bight, in 15 fathoms water, sand, but it is only safe in winds from the N. E. quarter. Small vessels anchor nearer shore, taking care to avoid the rocky patches of the bottom in letting go.

Fertiñanzo bank. Fertiñanzo point projects to the south, and is low and rocky. A reef extends about 3 cables S. and W. from the point, and on it are a number of rocks, dry at low water. This reef in reality extends 8 cables S. W. ½ S. from the point, and is composed of peaks with deep water between. The hummock farthest out is covered with 4 fathoms, and in fair weather the light-draught coasters pass between and over them, but in rough weather they cause a continuous line of breakers. To pass inside the dangers of this reef in fair weather, bring the church of Santa Maria in one with San Genjo point. With this bearing as a course a vessel may enter, keeping a depth of 3 fathoms, and coasters locally familiar often take advantage of it.

The bay coast. Two-thirds of a mile beyond Fertiñanzo point, and about 1 cable off shore, are the Bueyes (or Bulls) de Rajo, covered at high water. From thence to Marinulos point, 2½ miles farther eastward, there are several points with patches of beach. A rocky patch lies off Caero point, and a large rock off Marinulos point. The rest of the coast is generally clear, but the points should be given a berth of 2 cables, as the water off them is generally shallow. There are several villages along this part of the coast, the inhabitants being chiefly engaged in the sardine fisheries and fish-salting establishments. There are good anchorages in the bights.

Tamba island. Tamba island lies ½ a mile S. by E. from Marinulos point. It is nearly round, and its flat summit is 276 feet above the level of the sea. On its N. E. part are the ruins of the chapel of San Miguel, and buildings are erected there for a lazaretto. There is a small mole at the N. point of the island and a beach on the N. E. side, the rest of the shores being high and rugged. There is good anchorage on each side of the island, that on the west side being the deeper. Water may be procured from a spring in the N. W. part of the island. On either side there is a channel leading to the bar of Pontevedra, the northern being 4 cables wide and 11 feet deep and the southern 7 cables wide and 7½ fathoms deep in the middle. This latter is a frequent anchorage for the larger vessels that enter the bay.

To the northeastward of the island, between Marinulos point and the river Lerez, which disembogues at the head of the bay, there is a deep shallow bight, parts of which dry at low-water springs, called Combarro bay, from a town of that name at its head near a rivulet. There is the old convent of San Juan do Poyo ½ a mile inland.

Pontevedra. Point Pared, about 1 mile N. of Placeres point, is the northern limit of Pontevedra or Lerez river, and is high, round, rocky, barren, and steep.

Between these points is a large sand-bank, dry at low water, which forms the bar of Pontevedra. The shifting sands leave a channel in the middle, which is subdivided into two small channels by a ridge of sand. Both of these are nearly dry at low springs, and no vessel drawing more than 5 feet can enter at any time.

Inside the bar, off Lourido point, there is a depth of 14 feet at low water. Beyond this the channel is again divided by a sand-bank and a rock, which is buoyed.

Pontevedra, the capital of the province of the same name, is on the south bank of the Lerez, opposite the mouth of the Cabras river, a couple of miles from the head of the bay. A long bridge of 12 arches here crosses the river. The city contains 7,600 inhabitants. Provisions and water are abundant.

Tides. The establishment on the bar is 3h. 18m. The rise is 11 feet at springs and 7½ feet at neaps, and the velocity of the channel-current is 2½ miles with the flood and 3 miles with the ebb, increasing to more than 4 miles during freshets.

Marin bay. The low sandy point of Placeres, the south point of entrance, has a chapel on it, and between it and Pesquera point, 1¼ miles westward, is a bight with a flat shore, in the midst of which stands the town of Estrivela, and farther on, near Pesquera point, the town of Marin and a small river used by fishing-craft, which ground in it at low water.

There is shoal-water off Pesquera point, marked by a buoy, and there is a small shoal west of Placeres point.

The anchorage is safe and well sheltered. Vessels drawing 12½ feet anchor off the town in 2¾ to 4 fathoms water, sand and mud, and those of greater draught moor between Pesquera point and Tamba island, in 7 to 10 fathoms water, mud. With W. and S. W. gales the sea is sent into the harbor, but so broken as not to be dangerous.

The town of Marin has a population of 1,850, and is of considerable importance.

The bay coast.

Pesquera point is high and rocky, with a battery about one-third of the way up to its summit, on which is a watch-tower. The point is surrounded by a shoal, marked by a *red* and *white* buoy at its extremity.

From Pesquera point the coast runs nearly S. W. for 2¼ miles to Condeloiro point, which is easily known, being the foot of a hill with a flat summit. Between these points there are several spots of beach separated by points, off some of which are large rocks, but the water is deep and the bottom clean at half a cable outside them.

North of Aguete point there is an islet, flat and whitish, and a shoal extending about 4 cables N. and E., and a smaller shoal surrounds Condeloiro point. Between Condeloiro point and cape Udra there is a deep bay, 4½ miles wide, with general depths of 7 to 16 fathoms in it. The southern bight of this bay is named Bueu bay.

San Clemente point, the first projection southward of Condeloiro point, is rocky and uneven, with several rocks fronting it, and appears at a distance like an island, from the flat shore on either side and the low ground behind it.

Then follow the points of Monte Gordo and Petis, and off the latter are some rocks. There are several beaches along this part of the shore, and off them there are great numbers of sardines caught.

Mt. Castelo and Mts. San Lorenzo, 1,118 and 1,424 feet high, are about 1 mile E. of Monte Gordo point.

Bueu bay.

Bueu bay lies between Petis and Piedras points. It is about ½ a mile deep to the south, and has two beaches, separated by some rocky points. Back of the larger beach, at the head of the bay, is the town of Bueu, with a population of 500, most of the inhabitants being fishermen.

There is good holding-ground and perfect protection from wind and sea at the anchorage. Large vessels anchor off Piedras point, in 10 to 11 fathoms, sand and shells, smaller vessels going farther in.

About 2 miles S. of the town is the conical isolated peak of Mt. Magdelena, 1,121 feet high, which serves as a landmark to clear Zacharias bank, (page 100.)

Point Piedras, or Piedras Blancas, is formed of whitish rocks which seem to be cut off from the shore.

Point Caballo is low, and about 2 cables off it is an islet of the same name, a barren rock, about 18 feet high at low water. Outside of it and close to, the water is deep. There is another rock, dry at low water, about ½ a cable off shore, between these points.

Cape Udra. From Caballo point the trend of the coast is westerly, forming the head of a promontory terminating in cape Udra. Rocks and shoals lie close along the shore near Caballo point, and increase in extent as the western points are reached. Off Mourisca point are the Lobeiras rocks, at 4 cables N. E., and the Cabezo, a portion of the same reef, is ½ a mile off shore.

Cape Udra is the southern extremity of Pontevedra bay, at the entrance. The cape is low at its extreme, but rises into a rocky hill, 343 feet high, with a second peak a little farther S. E., and beyond these the interior of the country is high land. A reef with dangerous rocks on it surrounds cape Udra and extends seaward about 3 cables.

Directions. Pontevedra bay may be easily known when approaching it during the day by Mt. Curota and the islands Ons, Onza, and Salvora, to the northward of the entrance, and the Cies islands to the southward, and at night by the respective lights.

The Ons islands form two channels, the larger of which, the S. W. pass, is between Onza island and cape Udra, and this is the one used by large vessels. The Fagilda channel is much obstructed and only used by those locally familiar.

The S. W. channel is about 4 miles wide, with no dangers except Monteseco and Menguella banks, which may be avoided by not bringing cape Udra to bear farther E. than E. N. E. ½ E. until Onza island bears N.; then keep in mid-channel and follow the middle of the bay to the port of destination. In coming from the north give the Ons islands a good berth, and do not haul in until cape Udra is on the above bearing.

In going to Marin, keep the middle of the bay until S. of Fertiñanzo point, when steer for the south point of Tamba island.

In working in, Lobeiras bank and the shoals off Fertiñanzo point should be especially guarded against, and all points given a good berth.

The widest part of the N. W. or Fagilda channel is between the reef off Fagilda point and Picamillo bank, where there is a pass 4 cables wide. It may be used by approaching the point carefully until the breakers of the reef are recognized, passing them at a distance of 1½ cables, with the base of Cabicastro point in line with the double peak of Mt. Lorenzo, on a bearing of S. E. by E. ¼ E. southerly, until Fagilda point bears N.; then keep off a couple of points to the southward, to clear well the points until the middle of the bay is reached.

At night vessels may always enter by using the S. W. pass, by giving a berth of 2 miles to Onza island, and when directly S. of it heading N. E. about the middle of the bay until a convenient anchorage is reached, where daylight may be awaited.

In approaching from seaward, vessels should keep to windward of the entrance until quite near, on account of the currents.

It should be noted that with a S. W. wind outside, the wind is S. S. E. in the channels of the bay.

Pilots. There are no licensed pilots here, but large vessels desiring it can always procure one from the fishing-boats that lie near the channels.

Aldan bay. Aldan bay, formed between cape Udra and Couso point, 1¾ miles S. S. W., will accommodate vessels of the greatest draught, but it is exposed to N. W. winds, which bring in some swell, although Ons and Onza islands cover its entrance to some extent. The bay runs in S. S. E. for nearly 3 miles, gradually narrowing to its head, where there is a small bend to the eastward, but so shallow as only to admit coasters and fishing-craft, which lie safe in all weather. At the head of this bend is the town of Aldan, with a small stream of excellent water. The shores of the bay and the country inland are covered with well-cultivated farms, and on the bay shore there are many fish-salting establishments.

The coasts of the bay are steep, with patches of beach, and fronted with rocks and shoals, which should be avoided. From cape Udra the eastern coast trends about S. by E. ¼ E. 3 miles to Piedra Rubia point; thence to Con point, ⅓ of a mile farther south, the coast is lower, but steep and clean. Nearly 1½ miles from the cape there is a shallow bight, called Bon bay, which is unsafe and rarely used, being exposed to almost all winds from seaward. About 3 cables S. W. of Con point is another point with a large rock off it, and here ends the low shore at the head of the bay, between which and the Bouteye shoal, with 6 feet water on it on the north, is the best anchorage for small vessels. This anchorage is about 2 cables from the beach of Arneles, over sandy bottom.

Area Brava point, about half way in on the western shore, is of moderate height, and surrounded by rocks at the distance of 1 cable. About 3 cables N. E. by N. from the point is a patch with 4 feet water on it, and there is another, called the Dada Con, nearly ½ a mile E. by N. from Couso point. This latter point is also of moderate height and steep, with a shoal lying N. 3 cables from it. The least water on the shoal is 3½ fathoms. There are 13 fathoms without it and 11 fathoms between it and the point, and its extremity is marked by a *red* and *white checkered* buoy. Another shoal of larger extent fronts the coast between this point and that of Osas, a ⅓ of a mile to the S. W. It extends about ½ a mile W. from the land, and on it are several large rocks, always above water, called the Osas islets.

The best anchorage in the bay for large vessels is above Area Brava point, in 10 to 11 fathoms water, mud.

Directions. Aldan bay should be navigated with a leading wind, on account of the rocks and shoals fronting its shores. In entering, give a good berth to the shoals off cape Udra and Couso point; then keep in mid-channel, steering S. S. E. for Con point, being careful not to get the point anything to the southward of this bearing, and passing eastward of the shoals on the western shore. Several of the shoals are buoyed, but the buoys are often swept away and cannot be depended upon. Though there are no regular pilots, one of the sailors or fishermen, who know the bay perfectly, will come aboard if a gun be fired, and it is strongly advised to take one of them in entering.

Tides. The establishment of the port of Aldan is 3h. p. m. The tide rises 11 to 12 feet in springs, with an increase of 1½ feet with strong winds from outside, and 9 feet in neaps. The tidal current follows the direction of the channel.

Coast. From point Osas the coast trends S. by W. 3½ miles to cape Hombre, and is called the Vela, or Soavela. It is always exposed to the sea, is steep and inaccessible, and should be given a wide berth in going from Pontevedra bay to Vigo bay, and *vice versa*. Soavela point, about midway between the capes, is the base of mount Facho, 585 feet high, whose slopes extend N. and S. to Osas point and cape Hombre. A ruined watch-tower stands on its summit.

Cape Hombre, the west extreme of a promontory forming the north point of entrance to Vigo bay, is, like Subrido point, ½ a mile to the S. E., moderately high, rocky, and bordered with reefs. One rock, named Redonda, in the reef off cape Hombre is always uncovered, and though the reef extends only 1 cable off shore, it must be given a good berth. The English steamer Madrid (P. and O. Co.) touched on this reef in 1867 by rounding the cape too closely.

Cies or Bayona islands.

At 2 miles W. of cape Hombre, forming with it the northern entrance of Vigo bay, is Caballo point, the north point of the Cies islands, which thence trend in a southerly direction and cover an extent of nearly 4 miles in front of the entrance of Vigo bay, to which they form a natural breakwater. They are composed of three, or more properly of two, islands, the northern and middle islands being connected by a low, narrow neck of sand, over which the sea sometimes washes in a heavy swell.

The North Cies or Mt. Agudo island is the largest of the three, with an extent of 1⅘ miles N. N. W. and S. S. E., and an average width of 3½ cables. The steep conical hill, from which it takes its name, is 660 feet high and very rugged. The N. E. side is generally safe, but there is a reef extending 3 cables N. E. from a point near the middle of the island, which narrows the northern channel to 1⅕ miles. This reef terminates in Cantareira rock.

The western shore is bordered by rocks, some of them lying 2 cables off shore, and a shoal extends from the N. W. end of the island 1⅕ miles N. N. W., terminating in Biduido bank, with 2¼ fathoms water on it. Between this and the island is Roncosa bank, a rocky ledge, dry at low water, and there are a number of hummocks between the two banks, rendering any attempt to use the channels they form very dangerous. Biduido bank is marked by a globe buoy with vertical *red* and *white* stripes.

The Middle Cies or Faro island is the smallest of the three. It is triangular, and from the S. W. angle rises mount Faro, 570 feet high, on whose summit is the light-house. East of the isthmus connecting this with Mt. Agudo island is Lago beach, and off this beach there is good anchorage in 3½ to 11 fathoms water, sand and gravel. A reef borders the west side and extends 2 cables S. W. from the S. W. point, and off the S. E. point are the Bellas rocks and Viños islets at a little distance.

The South Cies or San Martin island is of irregular shape, about 1¼ miles long from N. W. to S. E. It is steep like the others, but not so high. On the N. E. side there is a safe beach, with fish-salting establishments and a house for pilots, and on Galera point there is a staff for the pilot-flag. The west coast is skirted by a reef, and Cabreira rock is 3 cables W. by S. from the point of the same name, with deep water between. The east coast is safe, except for Carrameiro rock, 2 cables N. E. of cape Vicos, and off the beach of Viños there is a tolerable anchorage for small craft.

Light: Lat. 42° 12′ 30″ N.: long. 8° 53′ 30″ W.

On the summit of mount Faro there is a light-tower, which shows, at an elevation of 604 feet above the level of the sea, a *fixed white* light, varied by a *white flash* every 30 *seconds*, visible 30 miles in clear weather, but on account of its great elevation this light is often hidden by the mist and haze.

Dangers.

There is a chain of islets and reefs extending south from the western part of San Martin island, narrowing the southern channel to about 2 miles. The nearest of these to the island is the Forcado, 4 cables S. W. from point Conceila. It is an islet surrounded by rocks, leaving a 9-fathom channel between it and San Martin island, which is sometimes used by small craft.

Boeiro or Agoeiro is a low, small islet, surrounded by a shoal lying a long mile S. W. ½ W. from cape Vicos. A light-house is to be erected here.

Another bank, named Castros de Agoeiro, is a rocky patch with 3½ fathoms water over it, 7 cables S. S. W. of Agoeiro. This is the most dangerous obstruction in the southern channel, and is marked by a beacon-buoy, with *red* and *white* vertical stripes.

Porta channel.

The Frende la Porta, or Porta channel, leads between the middle and south Cies. It is 3 cables wide, with a depth of 4½ to 11 fathoms in mid-channel. The shores by which it passes are high and steep, and the only danger to avoid is the reef off Faro point. The greatest depth is at the western entrance.

Vigo bay. Vigo bay is an arm of the sea running in about 15 miles to the N. E., with a varying width of 5 miles to 4 cables. It is entirely inclosed by mountainous land, broken by cultivated valleys which form a pleasing landscape. It contains several bays and sheltered anchorages that can accommodate vessels of any class; and though open to the S. W., the entire bay is much protected by the islands and shoals off the entrance.

Barra bay. Barra bay, 1½ miles across and nearly 1 mile deep to the N., is the first bight on the north shore of Vigo bay, between Subrido point and point Corbeiro, and, being well sheltered from N. N. W to N. E. winds, is a frequently used anchorage for vessels detained by these winds. The anchorage is near the middle of the bay, in 7 to 9 fathoms, mud. A beach extends nearly all around the shore. Salt provisions and water may be procured here, just beyond cape Pequeño.

Between points Corbeiro and Castros, ½ a mile farther east, the coast is tolerably high and is fronted by a reef of rocks, called Castros Barra, extending ½ a mile southward. The extremity of this reef is marked by a buoy, and also that from Subrido point on the west.

Limens bay. The bay of Limens is between the points of Castros and Borneira, more than 1½ miles distant. It is not so deep as Barra bay, and is chiefly used by coasters. From Borneira point a reef, possibly the most dangerous one in the bay, extends 4 cables southward, and is marked by a staff and cage buoy at its extremity. The southernmost rock, Bajo Borneira, only uncovers at low-water springs. This danger may be cleared by keeping Subrido point open of Caballo point North Cies island, astern, until Borneira point bears W. of N.

Zalgueiron rock lies 7 cables E. S. E. ½ E. from Borneira point, with 2½ fathoms water on it and 4 and 5 fathoms close to. It is marked by a buoy and globe, and should be carefully looked out for by vessels of considerable draught.

Changas bay. Between Borneira point and Rodeira point, 1⅖ miles N. E. by E. ½ E., is Changas bay, well sheltered from winds from W. S. W. to E. through W. and N., but unsafe with S. to S. W. winds. The east coast of the bay is a continuous beach, through which several streams flow, the west being high and steep, and the base of mount Castelo, 932 feet high. There is a lower hill on the west coast also, with a remarkably white chapel on the summit. The town is at the water's edge, west of the Bonsos rivulet. The population is 2,660. The best anchorage is off the town, in 7 to 9 fathoms water, sand, mud, and gravel. Water and provisions may be obtained here.

From Rodeira point to Con point, 1¼ miles N. E. by E., the shore is fronted by an extensive ledge of rocks, covered at high water, the farthest out of which, Piedra de Pego, is ½ a mile from the land. It is marked by a beacon. The western extremity of the shoal is also buoyed.

Con bay. Between Con point and Ruas point, 1¼ miles E. by N., lies Con bay, with a safe beach nearly all around it, through which flows the Meira river. A village of the same name is on the west bank of the river. At the head of the bay is the chapel of San Bartolome, on a steep black rock. Farther west and inland, are the village and church of Santa Maria de Meira, and west of Con point stand the village of the same name and the church of Los Remedios.

East of Ruas point, which is safe and high, is the islet of Ruas, with a narrow channel between. This point, abreast which the bay commences to narrow, is a little more than 1 mile N. N. W. of Guia point, on the opposite shore.

Domayo bay. From Ruas point the coast runs 1 mile E. N. E. to Domayo point, a black steep promontory, forming, with Bestias point, 1½ miles farther N. E. by E., the bight or bay of Domayo. The river Seco, on both banks of which the town of Domayo is built, empties about the middle of the bight, and off the mouth of the river is a small reef. The promontory west of the bight is formed by a spur of mount Faro de Domayo, 2,052 feet high, which has a conical summit, and appears almost isolated when seen from the S. W. It is the highest peak on the peninsula of Morrazo, and in making Pontevedra and Vigo bays from seaward it is the first land seen. The next to come in sight is N. S. del Alba, on the south side of the bay.

From Bestias point the coast is steep for 6 cables N. E. to San Adrian point.

Rande reach. Rande reach is the channel between Bestias and Rande points, leading to San Simon bay, which is formed by the bay enlarging at the head of Rande reach. This channel is 4 cables wide, with a depth of 9 to 16 fathoms in the middle, and safe shores, which are steep-to.

San Simon bay. The entrance to San Simon bay is between San Adrian point and Castiñeira point, 6 cables distant. The bay is 1½ miles wide and 4 miles long, and could accommodate and shelter the largest squadrons. The depth varies from 1½ to 3½ fathoms, sand and mud throughout, but the northern part is extremely shallow. In other portions the depths diminish quite regularly toward shore. Large vessels riding out their quarantine here anchor between the entrance and San Simon island.

Several points project into the bay, forming shallow bights, and near these points there are generally rocks and shoals. North of Caballa point the bay dries at low water.

Several streams empty into the bay, the largest of which is Redondela river. Mt. Peneda, 1,118 feet high, lies a short distance east of the north part of the bay.

The islands of San Simon, off Cabo point, on the east side of the bay, form a group of tolerably high, steep islets, the largest having the name of the bay. With the rocks near, they form a chain ½ a mile long N. N. W. and S. S. E., and are surrounded by a shoal extending a short distance. South of Cabo point there is a long, smooth beach, with the town of Cesantes beyond it. There is a depth of 11 feet quite near the beach.

The lazaretto is built on San Simon and San Antonio islands. Vessels in quarantine anchor S. W., W., and N. W. from these islands, within half a mile, in 1¾ to 3 fathoms water, mud, good holding-ground.

Redondela, a town of 1,816 inhabitants, is on the north bank of the Redondela river, and is connected by a bridge with Villavieja on the other bank.

La Guia. From Castiñeira point the coast trends nearly S. W. 3¼ miles to the point of La Guia, before reaching which comes the small bight of Teis, with a beach 3 cables long, off which there is good mooring-ground in 5½ fathoms water, sand. A village and brook of the same name are here. The points on either side of this bight are bordered by reefs.

Point La Guia is the base of a hill of the same name, 458 feet high, reddish in color, partly cultivated, and with a flat summit, where stands the hermitage of N. S. de la Guia, recognizable a long distance from its whiteness. The eastern part of the point is low, while the western terminates in a small plain and a bluff.

Light: Lat. 42° 15′ N.; long. 8° 40′ W.

On the north part of the plateau of the point of La Guia, and in the center of an abandoned circular battery, there is a tower 12 feet high, which displays, at an elevation of 102 feet, a *fixed white* light varied by a *white flash* every 3 *minutes*, visible 12 miles in clear weather. This is called Vigo light.

Cabron islet, just off the point and connected with it by a reef, is nearly W. of the light.

Vigo harbor.

At 4 cables S. S. W. of mount La Guia is the point and battery of Santa Tecla, and 1¼ miles S. W. ¼ S. from La Guia is the battery of San Andres, at Vigo, on the point of Lage. Between these two latter points is the harbor of Vigo, about 6 cables deep to S. E., and surrounded by a clean beach, in the middle of which Barreiro rivulet empties. The anchorage is off this beach, in 6 to 9 fathoms water, mud and gravel, where vessels moor with the heaviest anchor to N. W., the quarter of the strongest winds.

Vessels bound for the lazaretto anchor temporarily outside the harbor, in 11 to 13 fathoms water, mud, taking care when anchoring N. of Vigo to avoid the hull of a sunken wreck which lies half way between Lage point and Pego rock, (page 112.)

A ship that is aleak or has lost her anchors can, if it be possible to make San Simon bay, run aground in the mud there with a certainty of getting off again without damage.

Vigo.

Vigo, a walled city of 8,200 inhabitants, is built in terraces on the north slope of Castelo hill, a spur of mount Castro. It is the capital of the maritime province of Tercio, and is one of the stations of the P. & O. Co. and other steamer lines. The largest of the suburbs of Vigo is Arenal, stretching in a single street along the beach. It was attempted to build a sea-wall along a considerable portion of the town, as the custom-house, docks, store-houses, &c., are here, but the sea so constantly destroyed it that the work was given up.

The flag of the vessels of this district is *quartered red* and *white*. It comprises also Bayona, Guardia, Redondela, Changas, Marin, and Aldan.

The mole of Lage is small and almost useless from the accumulation of sand. The captain-of-the-port's office, &c., is on the mole. The battery of Lage commands the port, and is one of the principal defenses of the harbor. Exports are wine, grain, sardines, and salt fish, and there is a manufactory of metallic household utensils, turning them out to the value of about $47,000 per annum. In 1863, 1,225 vessels, of 177,129 tons, entered, and 1,227, of 180,078 tons, cleared. Provisions and water are abundant.

Between Lage point and point Castro is the safe bight and beach of San Francisco, and along this beach is the fishing-village of Ribera, a suburb of Vigo.

Point Castro is the base of mount Castro, 452 feet high, and crowned by Castro castle, a good landmark from the entrance of the bay for Vigo.

Coya bay. A long mile S. W. by S. from Castro point is Bonzas point, and between them lies the bay of Coya, bordered by a safe beach, where there is good landing for boats.

Point Coya is 4 cables eastward of Bonzas point. At 1½ cables N. W. from Coya point is Ardan rock, which only uncovers at low spring-tides, and between the two is a small islet, named Fosalla.

Bonzas point, low and stony, is surrounded by rocks, both above and below water, extending 2½ cables N. At 8 cables W. is Molino point, with a beach between, off which fishing-craft anchor in southerly winds. Near the extremity of Bonzas reef, which is buoyed, is the islet of Cabezon. The village of Bonzas is near the point on the side of a hill.

Molino point is steep and rocky, but low at the end, and at ½ a cable off the point there is a small rock which dries at low water. On the highest part of the point is a ruined wind-mill.

At ½ a mile S. W. ½ S. from Molino, is cape Mar, low and sandy, with a reef partly visible at low water, extending 3 cables W. N. W. from it. This reef is buoyed at its extremity, and the sea breaks on it when there is any swell.

Toralla island. From cape Mar the coast trends S., and then S. S. W. to cape Estaya, 2⅔ miles S. W. In the bight thus formed, and 6 cables distant from Serral point, in line with it and cape Mar, is the island of Toralla, 3 cables long N. E. and S. W. This island is of equal height with the land abreast, and at a distance appears to be part of it. It is surrounded by shoals and only separated from the land by a passage scarcely fit for coasters. Near the extremity of the reef at the west end is a checkered *red* and *white* buoy.

The shores of the bight are low, with occasional beaches, and near the shore there are a number of rocks at irregular distances. Two rivulets empty into the bight, and there are several villages near the shore. Small coasting-craft go inside the island for anchorage in N. E. winds.

The promontory formed by cape Estaya and Serral point is bordered by a reef extending more than 2 cables to the N. W. Marosa rock, the outermost and most dangerous, is to be buoyed.

Carreira bay.

From cape Estaya the coast, steep, unsafe, and skirted by a reef, runs south to Cangrejo point, where a beach begins. Here the coast turns to S. W., N. W., and W. to cape Sentaulo, nearly 2½ miles S. W. ½ S. from cape Estaya, forming the bay of Carreira.

Mount Ferro, the southwestern limit of the bay, is conical, dark-colored, and 1,135 feet high, forming a peninsula, united to the main-land by a low narrow isthmus. Its base is washed by the sea and skirted by numerous rocks, and it is a good landmark in making the bay. It terminates to the N. W. in cape Sentaulo, the southern limit of Vigo bay, though cape Silleiro is sometimes called the south point of entrance.

The Estelas and shoals.

At 3 cables off the western face of mount Ferro is a small island, the Estela de Tierra, between which and the land is a narrow passage, with 3 fathoms water between the shoals, that may be used by small craft in case of necessity, with a smooth sea, by keeping close to the island. This is named Porta channel, and besides the reef skirting mount Ferro there is a small shoal, with 2¼ fathoms water over it, nearly in the middle. There is a reef on the N., W., and S. sides of this island, leaving a narrow channel 1¾ fathoms deep between it and the Estela de Mar, 2 cables westward.

The Estela de Mar is completely surrounded by a reef, extending farthest N. and W., and beyond this reef are two others, with rocks, that partly uncover at low water, extending 6 cables from the island; and south of the western extremity of these reefs are two smaller ones, bearing W. S. W. 7 cables from the Estela de Mar. All these dangers are portions of a rocky plateau, extending westward from mount Ferro, and in a heavy sea form a mass of broken water. The most dangerous part of the reef is marked by a buoy with vertical *red* and *white* stripes and a globe. The buoy (beacon) near Los Castros bears from this one about N. W. by W., distant 1¾ miles. The buoys are alike, and mark the dangers on either side of the southern entrance to Vigo bay, and care should be taken not to mistake the one for the other in hazy weather, nor should too much dependence be placed on their positions.

Port Bayona.

From cape Sentaulo to cape Silleiro, 3⅖ miles S. W. ½ S., the coast-line is very irregular. At first the coast is low and takes a deep southerly sweep, forming the port of Bayona, after which it runs westerly, with several indentations, and is bluff and rugged to cape Silleiro.

The port of Bayona is nearly 1 mile wide and 1¼ miles deep, and is exposed to both N. W. and S. W. gales. It is, besides, much obstructed by shoals, and is used only by coasting-steamers and small craft. The eastern shore is fronted by a reef, and no vessel should enter without a pilot. The best shelter is abreast the town, to the S. E. of Tenaza point, which is the north extreme of a peninsular hill of moderate height, but steep over the sea, with the walls of an extensive castle on its summit. Several streams empty into this harbor, the largest being the Miñor river, and several towns are on the shores.

Cape Silleiro.

The coast from mount Real (Tenaza point) is rocky, and skirted by a reef. Cape Silleiro, the south point of entrance to Vigo bay, is high and rugged, and may be known by the light-colored granite light-tower, standing about 30 yards from the water's edge. The extremity of the cape is a low point terminating in a ledge of rocks, extending ¾ of a mile N. W. by N., and also bordering the west side of the cape. At low water many of these rocks are uncovered, and the outermost one is named Lobo de Silleiro.

Light. Lat. 42° 06′ 05″ N.; long. 8° 52′ 36″ W.

The first story of the light-house on cape Silleiro is square and the second octagonal. The whole building is 34 feet high, and adjoins the keeper's dwelling. The lantern displays, at an elevation of 72 feet above the level of the sea, a *fixed white* light, visible 17 miles in clear weather.

Landmarks.

In making Vigo bay, the marks are already described, viz: the Cies islands, the mountains north of the bay, and cape Silleiro. In entering port Bayona, the castle of mount Real, the chapel of Santa Marta, on a little sandy peninsula at the head of the inlet, and other remarkable buildings are seen, while east of the port 2½ miles inland is mount Parada, 1,378 feet high, and at 7 miles in the same direction is Galiñeiro, with three peaks. The northern peak is 2,317 feet high; the southern, 2,350, and on the middle one, which is the lowest, there is a white pyramid.

Caution. Both in entering Bayona and Vigo bays the headlands should be given a good berth, and it cannot be too often impressed upon navigators in these waters that but little dependence can be placed on the positions of the buoys, as they often drag or are swept away.

Pilots. There are a number of licensed pilots for Vigo bay, partly supported by the government. The station is on St. Martin island. These pilots rarely go outside the points, but wait for vessels at the entrance of the channels, and pilotage is not obligatory in entering or leaving the bay, but it is so in going from the anchorage of Vigo to the lazaretto of San Simon.

Tides. The establishment of the port of Vigo is 3h. 15m. p. m. The tide rises 13 feet in springs and 8 feet in neaps. The flood sets to E. S. E. and the ebb to W. N. W, the former with a velocity of 1 mile and the latter of ½ mile per hour.

Directions. There are only 2 channels that can be used by large vessels in entering Vigo bay, but a third, between the Cies islands, is sometimes used by small craft.

The N. channel would be used by vessels from the north with free winds, in which case—

Pass S. of Onza island, not less than 2 nor more than 3 miles distant, and when the island bears N. bring cape Hombre in line with Mt. N. S. del Alba, steering on this bearing until mount Ferro bears S. by E. ⅜ E., which clears the Biduido bank; from thence steer to pass cape Hombre and Subeido point at about 3 cables' distance, heading then for Molino point until the middle of the bay is reached; whence head for the chapel of La Guia until Vigo bears S. and the anchorage is reached. If obliged to work in, it is well not to shoal the water in nearing the coast to less than 7 fathoms, and to give all the points a good berth.

Vessels from seaward or from the south use the S. channel. In this case—

Bring the rocks off cape Mar in line with La Guia point, about N. E. by E., or the chapel and mountain of La Peneda, at the head of the bay, in the middle of Rande reach, steering on one of these bearings until mount Ferro bears S.; then head for mount Faro de Domayo until the chapel of N. S. de la Guia bears E. N. E. $\frac{3}{8}$ E., when steer for it and the anchorage.

To enter at night, bring Silleiro light to bear S. S. E. and Vigo light (La Guia) N. E. by E. Take the latter bearing as a course until between mount Ferro and cape Vicos, San Martin island ; then change course to N. E. until Vigo light bears E. N. E., steering thence for the light until the town bears S. as before.

To enter the north channel under like circumstances, steer to pass S. of Onza island, as before, until Cies island light bears S. The meridian of Biduido bank will then be passed and the open mouth of the channel will be seen. Steer for the middle of this until Vigo light is seen, which will bear about E. by N. ; from thence steer E. or E. ½ S. until this light bears E. N. E., when steer for it as above directed.

Porta channel ; directions.

The best landmark for this channel (only used by small craft) is Cies light-house. Entering from the west, bring the Viños islets to bear in mid-channel or about E. N. E., steering on this bearing until nearly through, when head more to southward, to give the islets a wide berth.

Port Bayona ; directions.

There are 3 channels leading to port Bayona, viz, the South, Estela, and Porta channels, the two latter being used only by small craft and under favorable circumstances. Unless locally familiar, this port should not be entered without a pilot, and one may always be obtained by firing a gun and hoisting a flag at the fore, though there are no licensed pilots, the sailors of this section acting as such.

In case of necessity, however, bring the peak of Parada in line with the central peak of mount Galiñeiro, steering on this bearing, or a little south of it, until the chapel of Santa Marta is open of the castle on mount Real, heading then to S. E. and southerly to the anchorage. These directions may be followed by a steamer or a sailing-vessel with a fair wind, but if obliged to tack a pilot is a necessity.

In leaving Vigo bay bound for Bayona, keep La Guia and Molino points in line until Forcado islet is open W. of Agoeiro, (Boeiro;) then steer for cape Silleiro, and when on the alignment of Mts. Parada and Galiñeiro proceed as above directed.

The favorable winds for entering by this channel are from S. W. to N. E. through W. The worst winds at the anchorage are from S. S. W. to S. E. through S. and the N.

W. winds. In heavy weather from seaward the reefs are all so marked by their breakers that it is comparatively easy to enter.

Tides; Bayona.

The time of high water, full and change, at Bayona is 2h. 15m. The tide rises 13 feet at springs and 7 feet at neaps,

Coast.

The coast from cape Silleiro runs about S. 15 miles to the entrance of the river Miño, and is all the way bordered by reefs and rocks. It is backed by a lofty rugged range of mountains, which begins at cape Silleiro and terminates in Mt. Santa Tecla. Between point Queimada, the southern point of the cape, and Urulluda point, 4½ miles S., is the shallow bight of Mougas, rocky and unsafe, which should be avoided with winds from seaward.

Urulluda point, north of which is the village and rivulet of Villasuso, is somewhat projecting, with 2 islets and a reef at its base. At 1½ miles farther S. is the little inlet of Oya, with a village of the same name.

South of Oya the coast is steep, rocky, and unsafe for 5½ miles to the port of La Guardia, which is used by fishing-craft. This is a small inlet, with a little beach, back of which is the fishing-village of the same name, and just north of this inlet is another, so obstructed by rocks that it is never used.

At about 1½ miles southward from La Guardia is mount Santa Tecla, at the entrance of the Miño river, the coast between being fronted by a reef extending ¾ of a mile seaward. All the reefs above mentioned may be cleared by keeping the east point of the Cies islands open W. of cape Silleiro.

CHAPTER V.

COAST OF PORTUGAL FROM THE MIÑO TO THE TAGUS.

Variation, 20° 55′ *westerly in* 1872; *diminishing* 7′ *annually.*

Portugal. The kingdom of Portugal, the western extremity of Europe, occupies about one-sixth of the Iberian peninsula, and its coasts extend from the mouth of the Miño river to the Guadiana, a distance of about 464 miles, of which 366 miles are on the western shore and 98 on the southern. It is the most western country of the continent. Its area is about 32,110 square miles, divided into 17 districts, and its population nearly 4,000,000. It lies like a band between Spain, which bounds it on the E. and N., and the Atlantic Ocean, which washes its shores on the S. and W. The country is divided into six provinces, which are: 1st. Duoro and Miño, between the two rivers of like names, and on the seaboard, small, but the most populous in proportion to its extent; 2d. Tras os Montes, in the interior, to the eastward of Miño and behind the Serra de Marão; 3d. Beira, divided into Higher Beira, on the north, and Lower Beira, on the south; the first forming the high plateau containing the district of Visen, the second comprehending those of Guarda and Castello Branco, and the portion on the seaboard those of Goimbre and Aveiro; 4th. Estramadura, the third in extent and population, lying on both banks of the Tagus, and extending to the sea; 5th. Alemtejo, the largest but least populated, lying S. E. of the Tagus and of Estramadura, between the frontier of Spain and the sea; 6th. Algarves, the smallest and most southern, embracing all the sea-coast south of Alemtejo.

Mountains. Portugal is very mountainous, Estramadura and the western part of Alemtejo alone forming a vast undulating sandy plain sloping toward the ocean. The mountains, simple prolongations of the Spanish ranges, in the Portuguese territory follow their southwesterly direction to the sea, which they reach in three places: at Oporto, toward the mouth of the Duoro; at cape Roca, near the entrance of the

Tagus, and at cape Saint Vincent, in the south, thus forming three vast groups or ranges nearly parallel.

Serra de Jerez.

The highest range is the Serra de Jerez, a continuation of the Cantabrian mountains of Asturia and Galicia. With its branches, the Serra de Suazo and the Serra de Marão, it constitutes the northern group. Its highest peaks are mount Gaviarra, which attains a height of 7,500 feet, and in the province of Tras os Montes, in the extreme north, mount Montezinho, which is 7,465 feet high.

Serra d'Estrella.

The central group, the Serra d'Estrella, is the most extended range in the country, a continuation of the great Castillian range. It covers the greater part of the province of Beira and terminates in Estramadura, on the right bank of the Tagus, in its branches of Junto, to the westward of Santarem and Cintra, on the sea-coast. Its highest peaks are always snow-clad, and in lower Beira attain an altitude of 6,880 feet.

Serra de Mamede, &c.

The southern group is by far the least elevated. Its branches, which are continuations of the range of the mountains of Toledo, extend south of the Tagus, from Spanish Estramadura over the eastern part of Alemtejo, to beyond Evora. They are called the Serra de Mamede, de Portalegre, d'Ossa, de Vianna, de San João, &c., and never attain a height of more than 2,150 feet; but in the south a distinct range, the Serra de Monchique, the most western spur of the Andalusian mountains, attains an elevation of 4,080 feet.

Earthquakes.

The formation of Portugal is volcanic, and earthquakes are frequent. The most disastrous occurred in 1356, in 1597, and in 1755, when Lisbon was almost totally destroyed. A more recent shock, in November 1858, was felt over the whole peninsula, but did little damage, except at Setubal.

Rivers.

Portugal is plentifully watered. From Spain it receives its three great rivers, the Tagus, upon the N. bank of which Lisbon is built; the Duoro and the Guadiana, as well as its two smallest, the Minho and the Lima. The others, which are less important, and which have their source in Portugal, are the Mondego, the Vouga, the Cavado, and the Sado. These rivers will be described in their proper place.

Productions.

Situated in a warm, temperate region, Portugal is, above all, a country of olive-trees, vineyards, and grain. It produces also cereals; possesses pasturage and cattle; silk manufactures are in progress; fruits of all kinds are abundant and delicious; flax, madder, and locust-wood are cultivated; the forests produce excellent woods for ship-building and carpentry, resin, and tar. There are also various mines of copper, lead, iron, tin, manganese, antimony, gold, silver and mercury; and among the minerals are granite, slate, agate, red sandstone, marble, and fire and porcelain clays.

Climate. The climate of Portugal is one of the pleasantest of Europe. The enervating heat which prevails in other countries in the same latitude is not experienced here, and cold is only felt in some of the most elevated sections of the northern provinces. There are, as it were, two springs every year, the first commencing with the month of February. In the three months following a dry heat alternates with stormy weather and heavy rains. July is the month of hottest weather, during which the thermometer varies from 68° or 71° to 104° or 111° Fahr., the heat not diminishing until after the end of August. Toward the end of September the equinox brings back the rain, and in October a new spring begins. In November and December large quantities of rain fall, and are accompanied ordinarily by storms. January is relatively the coldest month of the year. During the winter the thermometer varies generally between 41° and 61° Fahr., never falling below 27° Fahr. in Lisbon. Snow and ice are regarded there as veritable curiosities. Hail is also very rare throughout the country.

Coast. The coast of Portugal is generally steep, with occasional sand-beaches; but the greatest elevation attained by the mountains of the sea-coast does not exceed 980 feet. The only islands off the entire coast are the Burlings, which lie about 5 miles N. W. of cape Carvoeiro, and the Faro islands, under cape St. Vincent. Excepting the magnificent basin of the Tagus, there are very few natural harbors combining the conditions of depth and desirable security. Almost every port has a bar with very little water upon it, rendering it accessible only to small trading-vessels and coasters.

Salt-works and fisheries. Salt-works and fisheries form the principal wealth of the Portuguese seaboard. The former, numbering about six hundred, are scattered along almost the entire coast, give employment to many hands, and furnish a salt which is generally used for curing fish. In 1862 the quantity of salt manufactured was about 8,860,000 bushels, representing a value of about $450,000. Fishing is extensively carried on along the coast, the principal fish taken being the cod, sardine, and tunny. The tax of 6 per cent. collected on fish taken produced in 1865 $75,316. The total value of all fish taken on the coast and the islands adjacent amounted in 1863 to $1,612,200, or to $1,229,620 after deducting the amount paid for taxes and the value of the fish given to the fishermen. The sardine-fisheries alone were valued at $606,174. According to statistics published in 1861, the number of fishermen and assistants employed was 24,596, and the number of vessels of all dimensions 3,352, with 403 dredges and seines and 27,603 other nets, &c.

Winds.

As on the coast near Cadiz and in the strait of Gibraltar there are years termed *levanters*, there are years on the Portuguese coast called *northers*.

The following table, deduced from meteorological observations published by the observatory of Lisbon, will give an idea of the prevailing winds during two consecutive years:

Table of prevailing winds at the mouth of the Tagus river from October 1, 1863, *to September* 31, 1865, *with the corresponding barometric and thermometric variations.*

Winds.	Number of days of each wind.	Barometer.		Thermomet		Remarks.
		Maximum.	Minimum.	Maximum.	Minimum.	
Calm	10	....	....	....	....	These winds are generally fresh with clear sky throughout the entire year, but particularly from May to September.
N	128	30. 48	29. 67	76. 28	35. 96	
N. N. E ..	96	30. 46	29. 66	81. 50	39. 56	
N. E	110	30. 51	29. 59	84. 38	36. 14	
E. N. E ..	28	30. 24	29. 90	85. 82	35. 60	
E	38	30. 40	29. 54	80. 78	39. 92	
E. S. E ...	18	30. 26	29. 78	73. 94	50. 36	Winds fresh; sky overcast with occasional rain from October to April, particularly when they blow from S. S. E. to S. S. W. Fogs are frequent from October to February, particularly with wind from S. E. to S. W.
S. E	9	30. 14	29. 36	67. 64	50. 18	
S. S. E ...	2	30. 26	30. 10	66. 56	46. 76	
S	28	30. 09	29. 61	76. 64	49. 10	
S. S. W ..	45	30. 25	29. 34	78. 88	48. 38	
S. W	50	30. 44	29. 18	68. 00	48. 02	
W. S. W .	25	30. 22	29. 30	72. 68	48. 02	
W	26	30. 26	29. 74	78. 26	43. 16	
W. N. W.	13	30. 06	29. 29	71. 06	50. 36	Winds quite fresh with cloudy weather accompanied by occasional fogs in summer, but fresh with rain in winter.
N. W	49	30. 46	29. 78	79. 34	41. 90	
N. N. W .	56	30. 33	29. 76	77. 00	47. 12	

Barometer.

It will be seen from this table that the extreme barometric variation was 1.34 inches. That the greatest height, 30.51 inches, was attained in February, 1865; thermometer, 84°.38, and a clear sky. The minimum height was 29.18 inches in March, 1864; thermometer, 48°.02, with a stormy S. W. wind and showers of rain. From this it may be inferred that on the coast of Portugal the barometer rises with N. and N. E. winds, which are cold and dense, and falls with southerly winds, whether from southeastward or south-westward, or with more or less rain; but a sudden fall of the barometer always announces wind and bad weather.

Arranging the foregoing table according to the points of the compass, we have the following:

Months during the two years of observation.	Wind from N. to E.	Wind from S. to E.	Wind from S. to W.	Wind from N. to W.
1863.	*Days.*	*Days.*	*Days.*	*Days.*
October	12	5	8	5
November	24	5	0	1
December	25	0	2	2
1864.				
January	19	7	2	3
February	12	0	11	5
March	13	3	11	2
April	12	5	6	6
May	14	3	8	6
June	15	4	3	8
July	14	5	3	9
August	18	2	5	6
September	19	6	2	3
October	8	3	17	3
November	13	3	6	8
December	15	2	4	10
1865.				
January	6	2	15	8
February	15	2	3	8
March	20	0	4	7
April	9	4	10	7
May	15	2	9	5
June	14	4	5	6
July	20	0	1	10
August	14	0	6	11
September	17	0	7	5
Total for the two years	363	67	148	144

	Days.
It will be seen from this table that the winds from the northward, or from N. E. to N. W., inclusive, blew during	439
Those from the southward, or from S. E. to S. W.	134
Levanters, or winds from E. N. E. to E. S. E.	84
Westerly winds, or winds from W. S. W. to W. N. W.	64

From this it is evident that during a period of two years the prevailing winds were from the northward, and that they blew with greater regularity from May to September.

It should be stated that the observations were made at 9 o'clock a. m., an hour at which the wind blowing at sea is never well established, particularly in winter, and at the situation of the observatory, which is within the entrance of the river, and subject to the influence of the winds which blow in the basin of the Tagus. It may be asserted, however, and experience proves the fact, that on the coast of Portugal the most frequent winds are from the northward, southerly winds blowing from October to April, and alternately with winds from W. and N. W.

Currents.

The Portugese current, so-called, after passing cape Finisterre turns to the S. S. E. and S. E., sometimes approaching the coast very closely, and after rounding cape St. Vincent a portion of it joins the mass of ocean-water which enters the Mediterranean by the strait of Gibraltar. The velocity of the Portugese current is ascertained to be from 12 to 24 miles a day, but its force and direction vary with the prevailing winds, and it is well, on account of the uncertainty which exists from this cause, to make careful allowance for it when near the coast, particularly in winter or with strong N. W. winds.

Tides.

The coast of Portugal is washed by the tidal-wave which comes from the south in crossing the Atlantic, and which, after passing N. of the Azores, moves obliquely toward the coast of Europe with great velocity. It follows that on this coast the retard of the tide is progressive from S. to N. Thus the establishment of the port of Cascaes is 1h. 40m. p. m.; at Lisbon, 2h.; at the mouth of the Douro, 2h. 30m., &c. The greatest rise of the tide is 12 feet 10 inches to 13 feet 10 inches, with an increase of 2½ to 3½ feet at spring-tides near the equinoxes, if no atmospheric perturbation exists.

The direction of the wind has a great effect on the tides. Thus with winds from N. W. to S. W. through W. the tide is higher, and with N. E. winds it is lower than usual.

Fogs. The coast, particularly near the mouths of the rivers, is often visited by fogs. These prevail most in moist and mild winters, but the fog formed in the morning at the mouth of a river generally dissipates about noon.

Miño river. The mouth of the Miño or Minho river, which separates Portugal on the north from Spain, lies between Picos or Santa Tecla point and point Castillo, (Castle point,) distant 8 cables N. N. W. and S. S. E. from one another. This river rises in Galicia, flows near the towns of Lugo and Orense, has several affluents, of which the chief is the Sil, and finally empties into the sea after a sinuous course of about 130 miles, of which 24 are navigable. From its junction with Barja rivulet it separates Spain and Portugal, and this part of its course is nearly S. W.

La Insua. The little flat island of La Insua, whose fort, belonging to Portugal, defends the entrance to the river, lies nearly N. and S., at 1 mile from Picos point and ½ a mile from point Castillo, dividing the entrance of the river into 2 channels, both narrow and bordered by rocks, and considerably obstructed by shifting sand-banks. In the north channel there is a depth of 9 to 12 feet at high springs and in the south about 14 feet. A chain of rocks extends some distance from the N. W. extremity of the island, and there is an islet, Insua Vieja, off its N. E. side. There are several other ledges between these and El Diente, on the W., and the Bandera, to the S. E. The reefs surrounding La Insua intersect those bordering the points, and thus form the two channels above mentioned.

Both channels break with the least sea, and on account of the shifting bottom a local pilot is indispensable, so that directions for entering are useless. It may, however, be stated that vessels should only enter with a smooth sea and fair wind; that is, from S. to N. N. E. through W. for the North channel, and from S. E. to W. N. W. for the South channel.

The Minho is navigable as far as Salvatierra, 24 miles from its mouth, to which point the tide reaches. It is 9 cables wide abreast Camposancos, 6 cables at Caminha, and from 1½ to 3 cables as far as Tuy. Its greatest depth is between the beach of Caminha and the anchorage at Camposancos, where it ranges from 16 to 22 feet at low water. The course of the river is partly interrupted by sand-banks and islets, the most noteworthy being the Junqueiras, on the Spanish bank, about 4 miles above the entrance. The southern island has a circumference of 3½ miles, and only small boats can pass between it and the shore at high water; at low water the passage is fordable; both islands are low and marshy. The banks of the Minho are beautiful, populous, and highly cultivated, and besides the towns, of which mention will be made, there are many country residences.

Spanish shore.

Camposancos cove, situated immediately inside of the North pass, serves as a port to vessels seeking shelter in the Minho. The anchorage is in 9 feet water, sand and mud, and there is a convenient jetty for landing. The village is a little in rear of the beach, on the eastern slope of mount Santa Tecla. This anchorage is well sheltered from winds from N. W. to S. through N. and E., but with other winds, when strong, a heavy swell sets in, which strains the cables; besides, the currents during the floods are so strong that vessels not well secured are in danger of dragging ashore. When the wind blows from the mouth of the river vessels ride across the ebb and lie very uneasily, so that coasting-vessels unprovided with good moorings are frequently stranded on the beach during bad weather from seaward. A mile farther in, at a place called Spanish or Arriba mole, there is a little channel for small vessels.

At San Miguel, an anchorage 3 miles from the entrance and inside the eastern Junqueira, there is a depth of 8 feet just off the jetty at low water, while in the middle of the river the depth is 9 feet at low tide, with hard sand.

Portuguese bank.

The first place of any importance on the Portuguese bank is the fortified town of Caminha, S. of which there is a large bay with a depth of 8 feet, sand, at low water. It possesses a ship-yard, and is to be connected by rail with Oporto. Farther in, and 6 miles from Caminha, Villanovo do Minho is reached, and 10 miles farther is the town of Valencia, one of Portugal's most important strongholds. Almost opposite Valencia, on the Spanish shore, is the town of Tuy, a Spanish stronghold, and 7 miles farther to the E. is Salvatierra, near the confluence of the Tea and the Miño. Opposite

Salvatierra is the stronghold of Monzao, with which communication is held by ferry.

Tides. The correct establishment on the bar of the Minho is 2h. 30m. p. m. The sea rises 11 feet at the highest tides. The velocity of the current during springs is scarcely 3 miles an hour in the channels and on the bar; but when there are freshets, which are rarely severe, the ebb sometimes runs 4 knots. In the South pass the current sets S. to the beach, and in the North pass to the W. In general the greatest strength of current is along the Spanish bank. In the middle of the river it follows the direction of the channels.

Directions. The best landmark for recognizing the mouth of the Minho is mount Santa Tecla, which rises almost perpendicularly from the water's edge, on the Spanish coast, and is shaped like a sugar-loaf. From about 6 miles off shore, the fort on La Insua appears isolated in the middle of the entrance, and with a little attention it is almost impossible to mistake the mouth of the Minho for that of the Lima, 10 miles farther S., because there are no mountains near the mouth of the latter. In sailing along the coast, and approaching either from N. or S., mount Santa Tecla still serves as a landmark. If it be hidden, however, mount Santa Lucia, farther S., is a sufficient guide. It is 1,814 feet high, has a long, flat summit, and cannot be confounded with the sugar-loaf of mount Santa Tecla.

Outside anchorage. With fresh winds from N. E. to S. E. through E., when the entrance is difficult, coasters can anchor outside the mouth of the river and beyond point Picos, in 12½ to 13½ fathoms water, or S. W. of La Insua, with the same soundings. Vessels anchor in fine weather as well, to wait for a favorable tide. In winter vessels can always leave the river, if it does not break on the bar, particularly if they take advantage of a morning tide and the land-breeze, which blows regularly at that season.

Coast. From Castillo point the coast trends S. by E. 11 miles to the mouth of the river Lima. The land between the two is of moderate elevation near the sea, but a little farther inland is seen the long pine-covered mountain of Santa Lucia, whose summit is 1,814 feet high. This is the first land seen coming from seaward, and in clear weather can be seen 50 miles, forming an excellent mark by which to recognize this part of the coast. On the southern slope of this mountain stands the chapel of Santa Lucia, at an elevation of 640 feet, which serves as a landmark for the position of Vianna, situated 1 mile farther south. About 3 miles S. S. E. of the entrance of the Minho is the mouth of the little Ancora river, outside of which coasters can anchor in fine weather, and 5 miles farther there is a projecting point with a round mountain upon it, called Round or Gold mountain. A small gravel-bank lies off the point, and vessels, to avoid it, should keep out in from 6 to 7 fathoms water, at least. The town of Areoza, built in the form of an amphitheater, lies at the foot of mount Santa Lucia, and is 3 miles N. of cape Vianna.

Lima river. The Lima river rises in the Serra de Mamede, in the Spanish province of Orense, and after a course of about 60 miles empties into the sea, a little south of Vianna. It is navigable for small vessels as far as the bridge of Lima, about 9 miles from the mouth, a fortified position on the Portuguese bank. The mouth of the Lima lies between cape Vianna, a low and quite projecting point on the north, and cape Nivos, low also, and sandy, less projecting, but terminating in a sharp point. On this point is built a wooden jetty or breakwater, which extends to seaward, and beyond which the sands uncover at low water.

Bar. Cape Vianna, on which is seen fort Santiago, which defends the entrance, is fringed by a reef which extends about a mile to the south. This reef is a partial shelter to the bar, so that it may be crossed when others are dangerous. There is a depth of 5½ to 6½ feet of water upon it at low water, and as the floods of the river are rarely strong it undergoes less change than the others. Notwithstanding, as it is formed of light shifting sands, it is prudent to take a local pilot in crossing it. Vessels in crossing should look out for a rock which is nearly covered at high water, and which is inside the reef. It should be left on the port hand in entering.

It may be affirmed that the bar of Vianna offers no obstacle to navigation, because the channel is always kept free by the current of the river, whose waters are directed to the south by a number of rocks, and by a breakwater constructed on the N. bank to hinder the accumulation of the sands. It can be entered by vessels drawing 10¾ feet of water, under favorable circumstances, at high water;

but as the port or basin which the river forms near its mouth uncovers nearly ⅔ of its surface, vessels are stranded there at low water. There is a floating-dock and some quays on the north bank.

The Gates. The above-mentioned reef under cape Vianna forms also two little channels, called the Gates, through which the fishermen pass in and out. The northern one, which is the deepest, is narrow, and runs about E. and W. The other runs nearly NE. and SW., and is ordinarily preferred because it is wider and easier.

The city of Vianna, formerly surrounded by walls and important on account of its fisheries, has a population of 8,000 inhabitants. It is built on the N. bank of the river Lima, not far from its mouth, partly on the plain and partly on the slope of a hill. It is visible from afar on account of its size and the whiteness of its houses. It has a large coasting-trade. It exports a small amount of salt. There is a grain-market in the town, and one for feldspar in the suburbs. It also has a ship-yard.

Ponte de Lima. Ponte de Lima is in a charming situation, on the left bank of the Lima, which is here spanned by a bridge of 24 arches, constructed by Pierre le Justicier.

Tides. The establishment on the bar of Vianna is 2h. and 30m. The tide rises from 10 to 11 feet at high springs.

Directions. It has already been stated that a pilot should be taken in entering the Lima. If, however, one could not be procured, a vessel might enter in case of necessity by the following instructions: To double the reef of rocks which extends a mile from cape Vianna, and to the southward of which vessels must pass, bring the little round hill named Faro, and covered with pines, which is on the south bank of the river and opposite the town, to bear E., and steer for it until within ½ a mile from the shore; then steer N. for Fort Santiago, or a little E. of N.—and on this course the vessel will pass nearer the rocks (or at ⅔ of the distance toward the rocks) than the western extremity of the spur on point Nivos—until the river is well open; steer then for the channel that may be used when thus coming from the south.

Signals. When the pilots of the bar of Vianna cannot go out, and the passage is practicable, they signal from fort Santiago with a *red* flag. The flag hoisted shows that there is enough water on the bar to enter. If the *Portuguese* flag be hoisted over the *red* flag, the bar is bad and vessels cannot enter. A *cannon-shot* indicates that it is absolutely impossible to enter and that vessels must put to sea.

Outside anchorage. In fine weather vessels can anchor beyond the bar and outside the reef in 7 to 8 fathoms water, the town of Vianna bearing NE.

St. Bartholomew rocks. For 4 miles S. of Vianna, or as far as the bar of the Neiva river, the coast is a low sand-beach. It then becomes tolerably high and level, with moderately high land behind it, until Villa de Conde is reached, which is at the entrance of the Ave 17 miles farther. St. Bartholomew rocks, or Pedra do Pontel, commence at point Pedra do Pontel about 3 miles S. of Vianna and extend nearly parallel to the shore for 3 or 4 miles.

Their southern extremity is 1 mile from the coast, but the northern extremity almost touches it. They form several shoals, some of which uncover at low water, while others are always covered. In order to avoid them vessels should keep at least 3 miles off this part of the coast, or in 11 fathoms water when off the Neiva river.

Besides the St. Bartholomew rocks there is another isolated ledge, called Raven rock, which lies 2½ miles from shore and SW. of the most southerly of those just described.

Loss of the Corinthian. The Corinthian was lost in July, 1864, on a rock from which it is said the Vianna fort bears N. 3¾ miles, and Neiva castle E. 2¾ miles, which places the rock quite near shore and about 1 mile N. of the mouth of the Neiva river.

Coast. South of the St. Bartholomew rocks the coast is safe as far as the entrance of the Espozende river, 10 miles S. ¾ W. from the Lima river. In occasional ravines between the Lima and the Cavado, streams of water are seen hurrying downward to the sea. The most important of them is the Neiva, whose mouth is closed by the sands at low water and is defended by a fort. The coast is moderately high and pretty regular, and mountains lie in the interior, the most remarkable being the Serra de Faro, of a dark color relieved by patches of sand and with a cleft in the summit which is visible for 18 or 20 miles when the mountain bears from E. to NE.

Cavado river. Cavado river, 6 miles S. by E. from the Neiva, rises in the Serra de Jerez in Portugal, and after a SW. course of

65 miles empties into the sea between the towns of Espozende and Fao. The mouth of the Cavado is dry at low water and its shifting bar demands the assistance of a pilot in entering. Further, it can only be crossed by coasters, as there is only 6 feet of water on it at high tides, and when there is heavy weather outside the channel is sometimes entirely obstructed. The river is navigable for 6 miles.

Light: Lat. 41° 31′ 24″ N.; long. 8° 40′ 30″ W.

In 1867, a *fixed red* light was shown from the old fort on the southern point at the entrance of the river to distinguish the bar during the night. It is 45 feet above the level of the sea and in clear weather is visible 7 miles. The lantern surmounts an iron column fixed in the platform of the fort.

Espozende.

The town of Espozende, which gives its name to the bar of the Cavado, is daily gaining importance from its fisheries and navigation. A few vessels are built there. It contains 1,700 inhabitants and is on the north bank of the river near its mouth. Fao lies a little farther up the river on the opposite bank and both are remarkable for their tall spires. Barcellos, on the right bank of the Cavado, which is here spanned by a fine bridge, is renowned through the country for its fairs.

Cavallos de Fao.

The Cavallos de Fao are two parallel reefs lying awash opposite Fao and south of Espozende bar. They are 1½ miles from shore and extend about 2 miles south, and care must be taken to avoid them in sailing along the coast. To do this, vessels should not come inside of 13½ fathoms water. There is a passage inside of these reefs with 4 to 5½ fathoms at low water, but the channel must be well known. In case of necessity vessels can anchor for shelter under these rocks. There is said to be a third shoal a little S. of the Cavallos. It should be half a mile from shore and nearly half way between Cavado river and Carreiro point.

Coast.

South of the Cavado river the coast is low and sandy, and is backed by the mountains or Serra de Franqueira, which stand parallel with the coast some miles inland. At 7 miles S. by E. from the mouth of the Cavado lies point Carreiro or Ablemar. It is sandy and surrounded by rocks, the most remarkable being a forked rock named Penedo de Ablemar. It is always uncovered and lies 109 yards from shore opposite the village of Ablemar. This village lies a short distance SE. of the point, numbers 1,000 inhabitants, and is distinguished by the hermitage of San Andres, which is on the point about half a cable's length from the beach.

Povoa de Varzim.

This important town is on the shore of the bay formed by point Carreiro on the north and the entrance of the Ave on the south, and on a bight sheltered by a chain of rocks. Its population, about 7,000, are occupied in fishing and employ nearly 250 fishing-boats. The little harbor of Varzim is not even accessible to coasters. It is a little beach sheltered by the chain of rocks already mentioned, which extends SSW., and in the middle of which is a channel where the fishing-boats pass through to haul up on the beach south of the town.

Light: Lat. 41° 24′ N.; long 8° 39′ W.

During the night in thick and foggy weather a light is shown on a tower built a little distance from the beach and south of the town. It is elevated 52½ feet, and is a *revolving white* light, revolving once every 5 *minutes*. (From N. and S. it appears to revolve, but from W. its character is not well marked.) In clear weather it is visible from 9 to 10 miles, but it is only lighted when the fishermen are out at sea.

Ave river.

Ave river, 4 miles SE. of point Carreiro, where the coast commences to rise, takes its rise in the Serra de Cabreira, and empties into the sea near Villa do Conde. Its bar, obstructed by many rocks, both above and under water, renders a local pilot necessary. Only small vessels can enter the river by passing S. of the rocks, and this channel when it exists is very narrow and dangerous. At low water springs there are 5½ or 6 feet water on the bar, but as soon as it is crossed the water deepens, and vessels find shelter in the Ave, though they are often aground at low water. This bar, like all those of the coast, is very variable.

Villa do Conde.

Villa do Conde, with 3,200 inhabitants, is on the N. bank of the Ave river, near its mouth, and on the opposite bank is the village of Azurara, easily distinguished by its high steeple. The inhabitants of these towns are almost all engaged in fishing and commerce. In the former a few ships are built and many coasting-vessels.

Directions.

The position of Ave river is shown from the sea by the convent of Santa Clara, on the brow of a hill about ENE. from the town. It is surrounded by a group of houses, so that from the sea it has almost the appearance of a city. There is also a long aqueduct parallel to the coast, and a large white house near the mouth of the Ave, which show the position of the river. All these objects are visible from 16 to 18 miles in clear weather.

Dangers.

Several dangers have been determined off this part of the coast. According to Lloyd's agent at Oporto, there is a chain of rocks a little SE. of the light of Povoa de Varzim; and 3 miles farther, in the same direction, a large reef on which the sea breaks violently in bad weather. The latter is probably identical with Orestes bank, which is described below. In 1834, the brig-of-war Orestes struck twice in a few seconds on a danger that must have been very steep, for at 1 cable beyond no bottom could be reached with the hand-lead. From the rock the north side of Villa do Conde bore NE. by E. ⅝ E. and the south side ENE. ½ E., distant more than 3 miles. The charts show 24½ fathoms water at this position, but it is well to keep 4 or 5 miles from shore in passing.

Coast.

From the mouth of the river Ave the coast trends S. by W., 10 miles to the mouth of the Leça river, forming a beach backed by low lands with mountains of moderate height beyond. The highest of the latter is Serra Santa Eufemia, 5 miles inland. The coast is very well populated; and along the sea-shore there are a number of rocks uncovered which generally extend a little to seaward. The soundings are quite regular, varying from 18 to 20½ fathoms at 2 miles from the land, increasing regularly to 64 fathoms at 10 miles.

Leça river.

The Leça river empties into the sea through a small inlet, open to the WSW., and in which at high tide there is only enough water for boats. The town of Leça de Palmeira, with 1,500 inhabitants, is on the N. bank of the inlet near the entrance, and opposite it is Matozinhos. The hermitage of Matozinhos or Jesus de Bouças is so inclosed in a grove of poplars on the north slope of mount San João d'Apolonio, that it can only be seen for a short distance. On the beach ½ a mile S. from Matozinhos is the hermitage of Jesus de Area, where there is a well of excellent water.

The Leichoes.

This name is given to a chain of islets lying off the mouth of the Leça, and nearly parallel to the coast. They are about 4 cables in extent N. and S., and form a segment of a circle with the convex side to the sea. Inshore or inside the rocks shelter is found from winds from N. to WNW The Leichoes are always uncovered, and the northern portion describes a curve whose extremity nearly unites with the reefs of the coast, which are 2 cables distant. The southern end lies 7 cables from shore, and thus forms a channel to enter the basin lying between the rocks and the coast. There are 5½ to 12½ fathoms in the southern channel, and 3½ to 6½ fathoms in the northern. There is a depth of 5½ to 7 fathoms in the bay formed by the Leichoes, and during cross winds this is the only shelter on this part of the coast for a vessel driven in under the land in bad weather.

Pilot and fishing boats can almost always put to sea from this bay at times when it is almost impossible to do so from any other point along the coast, on account of the surf. In time of war, privateers take refuge there.

At about 2½ cables from the shore, and about E. and W. with the hermitage of Jesus de Area, there is a rock covered with 11 feet water at low tide, and on it the sea almost always breaks. This rock is dangerous to vessels entering the bay of the Leichoes in sailing along the coast, and it should be carefully avoided, for vessels caught in its breakers run great danger of capsizing. This danger lies ESE. of the most southern of the Leichoes.

Directions. In entering the bay of the Leichoes for an anchorage it is better to avoid the northern channel, for though it is quite deep enough for any class of vessel it is very narrow. The southern passage should be used, as it is larger and deeper, passing nearer the most southern islet than the coast to avoid the rock of Jesus de Area, above mentioned. This islet may be approached within a cable's length in 8 to 11 fathoms, and anchorage taken in the middle of the bay.

There is a project to turn this bay into a harbor of refuge by building a breakwater from each extremity of the Leichoes toward the shore, and building quays and docks along the banks of the Leça, with a railroad to Oporto to transport the merchandise landed there.

Fort Neves, built on the sea-shore, one cable's length N. of the entrance of the Leça, defends the bay of the Leichoes.

The Douro. South of the Leça the sand-beach extends S. 1½ miles to the fort at Queijo, (black fort,) where the coast begins to be rocky and higher, but keeps the same direction for a mile and a half more to fort San João da Foz, on the north point of entrance to the Douro. This river separates the provinces of Beira and Minho. It rises in the Serra and lake of Urbion, in the province of Soria, traverses the provinces of Burgos, Valladolid, and Zamora, the most mountainous of the provinces of Leon and Salamanca, commences to separate Spain from Portugal near Miranda, and finally enters Portugal near Fregeneda. In Portugal it passes through the midst of the granite regions of Tras os Montes, then waters an immense vine country, and finally empties into the sea at Oporto, after a course of 390 miles, during which it receives numerous tributaries, the more important ones being in Spain. Throughout most of its extent the Douro passes through lands which are easily washed away by the current during the floods, and in Portugal the channel of the river is always narrow and over a rocky bed. The water thus confined attains a great velocity, which in some places, it is stated, exceeds 9 miles per hour, and the average velocity is probably never less than 3 miles. In consequence of many works of improvement, and especially the removal of rocks which encumbered the channel at San João de Pesqueira, about 35 miles above Oporto, the river is now navigable for 65 miles for small craft, and there are light-draught boats which ascend 30 miles higher, but interior navigation is often interrupted by freshets, following heavy rains or the melting of the snow.

Channel. The entrance of the Douro is much narrowed by reefs, banks, and detached rocks on both sides. From San João da Foz a reef extends SW., terminating in the Filgueiras and Ponta do Dente, which form the northern limit of the channel, and from Cabedello point a sand spur, island, and reef extend N. and W., forming the southern limit, and between these dangers, in the channel itself, are the Picão rock and Abra shoal; at the entrance and farther in, near the mole of Anjo, are several dangers, which will be noticed in their places. There are two dikes constructed, one on each bank, inside Cabedello bank, to direct the current and give a sufficient depth for navigation in the channel. These dikes are about awash at high water.

But the greatest obstacles at the entrance are a long sand-bank, forming a bar west of the dangers mentioned, which is constantly shifting, though it preserves a depth of about 3½ fathoms at ordinary high tide, and a second bar abreast the eastern part of San João da Foz. From November to May there is generally a ground-swell on the outer bar, but even when heavy enough to be dangerous it rarely reaches more than 1 mile to seaward, except during westerly gales, and at such times, particularly during the ebb, it is extremely dangerous to attempt to enter the river. When a heavy sea rolls in from the west and meets an opposing current, (as at the ebb or during freshets,) the breakers are said to be terrible, and vessels have been prevented from entering or leaving for four or five weeks at a time. Yet the dangers of the bar are much exaggerated by the pilots, whose noise and confusion in bringing a vessel in is intended to produce undue impressions of intricacy and danger, whereas vessels drawing from 9 to 12 feet may safely enter at high water, and even at half-flood, without a pilot, many cases having occurred in which masters, who would not be imposed upon, have brought their vessels over the bar in defiance of the pilots' assertion that such a step would be impracticable. But during freshets the danger is real. In 1860 nine vessels were lost at the mouth of the river, and recently a large steamer was wrecked on the bar without its being possible to render her any assistance.

Although the bar may be impassable, it does not follow that there can be no communication with the shore, as even at half-ebb, the worst time of tide for the bar, boats can go off from the beach between Foz and the light-house, and nearly at all times from the huts of mount Orasto. The boats used for this purpose (catraias) go through very heavy seas safely when no ship's boat could live.

Beyond the eastern extremity of San João da Foz the channel is deep but crooked, and is lined by shoals on both sides as far as Lazaretto point. The banks are high, and the average width of the river is 2 cables, until abreast of Oporto, where it narrows to 145 yards. The depth in mid-channel varies from 2 to 8½ fathoms, the deepest water being in the narrows formed by spurs of Rabida and Furada mountains, where it ranges from 4 to 9 fathoms.

On mount Nossa Senhora da Luz, and near the church of the same name, at an elevation of 114 feet, stands a tower 56 feet high, square at base and cylindrical above, which displays, at an elevation of 170 feet above sea-level, a *fixed white* light, varied by a *white flash every minute*, visible 15 miles in clear weather.

Light: Lat. 41° 9′ 9″ N., long. 8° 37′ 10″ W.

San João da Foz. The town of San João da Foz, at the northern entrance of the river Douro, is a favorite summer resort on account of the sea-bathing. It is at the foot of mount Nª. Sª. da Luz, and has a population of nearly 7,000, chiefly fishermen and pilots.

Oporto. Oporto, the second city in the kingdom, is built like an amphitheater, on the side of a hill some 200 feet high, and is surrounded by hills averaging 500 feet, the highest being mount Congregados. These heights are fortified, and the city is further defended by batteries, &c. It has, with Villanova da Gaya, a population of 81,500; the streets are well paved, and the houses are of granite; there are many fine buildings, including churches, convents, hospitals, custom-house, exchange, &c., and the private dwellings are scattered along the river bank N. and S. for some distance. The climate is said to be healthy, but in July and August the heat is terrible. The temperature is lower than in Lisbon, rain and moisture are more abundant, and NW. winds prevail during the greater portion of the year.

Wine is the chief export of Oporto, and in 1866 the amount exported was 4,760,901 gallons, representing a value of $930,000, together with oil, sumac, cotton, cream of tartar, metals, hides, wool, wood, live animals, salt, leather, and cork. It possesses cotton, wool, and silk factories, founderies, tanneries, rope-walks, breweries and distilleries, potteries, and porcelian works. The principal imports of Oporto are grain, sugar, coffee, cotton and woolen stuffs, rice, hemp, flax, and dried fish. The commerce of this port is considerable. In 1860, 871 vessels, of 130,248 tons, entered, and 849 vessels, of 133,997 tons, cleared, of which number 1,235 vessels, of 169,060 tons, were engaged in the coasting trade and in trade with the Portuguese colonies. In 1862 the value of exports amounted to $32,935,950 and of imports to $43,220,820. The Peninsula and Oriental Co.'s steamers touch at Oporto, and there is a regular steam communication with Lisbon, London, Liverpool, Glasgow, Marseilles, Bordeaux, &c.

Resources. The city has excellent water, and all the necessaries of life are abundant and cheap. There is a watering-place at the fountain at the foot of mount Rabida, another on the opposite bank near the lazaretto, and another at a fountain near the ex-convent of San Antonio. There is a well supplied coal-yard, and a ship-yard where fast sailing vessels are built, and where repairs may be made. The port dues are the same as at Lisbon, with an additional charge of 100 reis per ton levied to defray the expense of the necessary work for the improvement of the bar.

Villanova da Gaya. Villanova da Gaya, formerly called Calle, was the original town. It extends along the south bank of the river opposite Oporto, between the Serra convent and the heights of Furada. In it are the principal wine lodges and dépôts: It formerly gave the name of "portus calle" to the port, from which, it is said, the present name of the kingdom is derived. A handsome wire suspension-bridge connects Oporto with this town.

Aspect. The land in the vicinity of Oporto may be easily recognized as the heights of Rabida and Furada, 200 feet high and only 1½ miles from the sea-coast, which form the river gap, point out the entrance by the peculiar haze behind them. It may also be known from a considerable distance and in moderately clear weather by the hills of Congregados and Lapa, on the northern limits of the city. The latter, the nearer of the two, and 500 feet high, may be distinguished by a round tower near a gloomy-looking convent on the heights over Matozinhos. NW. of Lapa is the conspicuous chapel of San João da Apolonia, easily recognized by its 3 umbrella-shaped trees. On the southern range, and at nearly the same distance from Lapa, is San Ovido watch-tower, about the same apparent magnitude as the chapel of San João da Apolonia, and at the entrance, close to the water, the church of San João da Foz is very conspicuous in fine weather.

In clear weather the fort of Foz will be seen at the water's edge and on a rocky point, W. of the town. SE. ¾ E., at 1 cable from the fort and also at the water's edge, stands the marine hospital, a square and isolated building, and 3 cables farther to the east, at the angle of the mole projecting to the S., is the Anjo, a square building with a white dome. Lastly, N. of, and at a short distance from, the latter building stands the chapel of San Miguel or of Anjo, surmounted by a tall cross.

North of Foz may be seen the black fort of Queijo, with a white-domed tower in each of the 4 angles, built on a rocky point 1½ miles NW. by N. from the light-house, and if the ship be north of the bar, the steeple of Clerigos, the church of Santa Catharina, &c., will also be seen.

Coming from the south into 12 fathoms the first object seen will probably be the fort of Queijo to the north; to its right mount Crasto, flat topped, with a battery; farther east, mount Nossa Senhora da Luz, with the light-house on the summit; and yet a little farther to the east the church of San João da Apolonia, surrounded by its umbrella trees.

If, in making the land in foggy weather, the above-mentioned elevated objects cannot be distinguished, it would be well to keep a lookout on the shore, remembering that while there is a continuous sand-beach south of the Douro, there is a portion of it, commencing some miles south of Cabedello and extending to Ovar, which is covered with huts. If the beach seen be sand with occasional large, round rocks, look to the N. to find out if the slope of dark land terminates in sand with a clump of these rocks on sand and slope. If so, the vessel is off the southern and shoalest part of the bar. Following the line of the sand, which juts in a long spit to the north, fort San João da Foz, South Filgueira, &c., will be seen.

If on the contrary the coast be formed of abrupt rocky points separated by sand-beaches, the vessel is north of the bar, and the black fort of Queijo will be seen at the point where the long sand-beach, reaching to the N., commences. The convent of Santa Clara, near Villa do Conde, may assist in determining the position of the ship, but the water should not be shoaled to less than 10 fathoms, and it would be prudent to stand off to the SW. to avoid the Leichoes.

Should the weather be too gloomy to make out the above landmarks, the lead must be carefully used and need never mislead if south of the Leichoes. Off the bar the bottom is hard sand, while N. and S. of the bar it is sand and mud. With 9½ to 11 fathoms water, hard sand, the vessel is a little over a mile from the bar and the ground-swell of the banks, if there be any, should be felt. North of the bar, in clear weather, the convent of Santa Clara, near Villa do Conde, may be seen.

Approaching the bar.

In clear weather the city of Oporto is visible from 12 to 14 miles. The steeple of Los Clerigos is very prominent, and by bringing it to bear E. the land may be approached until in 8½ fathoms, so as to pick up a pilot; then, if the church of San João da Apolonia can be seen, bring it in line with the light-house at N. 37° 30′ E., and run on this course until the church of Santa Catharina and the southern belfry of Lapa are in line. These bearings put the vessel in from 6 to 6¾ fathoms, and in the best position for taking a pilot. If it be necessary to wait, turn the ship's head to seaward, or to the W., and in this position the current which sets out with great rapidity will prevent any danger of drifting on to the banks. This outgoing current, especially in winter, lasts until the freshets have been overcome by the ordinary flood-tides, which are very regular from June to November.

In approaching during the night, vessels should not go inside of 15½ fathoms, unless the weather be very clear, in which case they can keep on until in 11¼ or 12½ fathoms, when it is well to anchor with the light bearing NE. by E. ¼ E., and wait for daylight, because in the event of calms, morning fogs, currents or east winds, a tide might be lost.

If the fog be not very thick, Santa Catharina church and the white dome of Anjo will probably be visible. With these two marks in line, a vessel drawing 12 feet may approach until in 5 fathoms water. Still, as long as the black fort of Queijo is kept open W. of North Filgueira, at about 4 times the width of the latter, there is no danger at this depth if the ship's head is put to seaward and steerage way is kept. If there be much swell the vessel will on these bearings be probably on the line of the rollers, and should not keep quite so far in.

The bar of Oporto is an unsafe lee shore, especially with the wind from W. to SW.; but with NW. winds vessels may approach with safety to examine the state of the bar, provided, always, that the latitude be accurately known or the land made out, and the usual precautions of the lead and a good lookout be attended to. If the weather should be so hazy that San João da Foz fort and the light-house cannot be distinguished, it will be unsafe to approach the bar. At the same time it should be borne in mind that if the haziness commenced before 10 a. m. and be not the result of bad weather, it may be expected to clear off about noon.

The establishment on the bar of the Douro is 2h. 30m. **Tides.**
The tide rises about 10 feet at springs and 7 to 8 feet at

neaps, with an increase of 10 to 12 inches with W. winds, and a corresponding decrease with E. winds. The pilots affirm that in the heaviest freshets the tide is not increased on the bar more than 1 foot.

Freshets.

The freshets are occasioned more by extensive thaws in the mountains than by heavy rains, and may be expected in their greatest force during the months of March and April, and even as late as May, but the increased rise and rapidity of tides due to rain alone may occur between November and May. The latter do not produce any dangerous consequences; but thaws and rain combined occasion such an increase in the rapidity of the stream that vessels cannot then trust to their anchors, which are sometimes undermined by the current, and trees and other large bodies are not unfrequently brought down by the stream.

When the great freshets are about to take place, no tide is perceptible for sometimes 2 days before, and if, in addition to this, the passage of considerable débris and flakes of foam with the current be noticed, no matter how slowly they move, all precautions must immediately be taken, for very shortly the waters will rise.

The rise is sometimes very great. It is said by actual measurement to be 10 feet above springs, and the velocity from the sudden fall at the bend has been estimated by the pilots at almost 14 miles.

During the freshets the vessels are secured in tiers, the innermost being secured to stone bollards or ring-bolts let into the piers for the purpose, and are kept about 40 feet from shore by brows, both forward and aft, well lashed, to admit of rising. During the vernal freshets additional precautionary measures will probably be necessary.

After a freshet the anchors and moorings should always be cleared of the débris that has fouled them, and as the waters begin to fall vessels should commence at once to haul out a little, to avoid being stranded, in which case no assistance from shore can be depended on.

Pilots.

The constant shifting of the sand forming the bar renders it necessary to sound the channel every 3 or 4 days, and to maintain a numerous body of experienced pilots, who are always ready to go off when a vessel is in sight, unless the weather prevents their getting out, or if the marks cannot be seen. They will also go off at night if fine. These pilots use row-boats flying a *red* flag. The pilot-dues are heavy, from 50 to 60 dollars a ship; tonnage-dues are 45 to 270 *reis* (5 to 33 cents) for Portuguese bottoms, and 90 to 450 *reis* (9½ to 58 cents) for foreign bottoms per cubic meter, according to the cargo.

Signals.

If the pilots cannot go out, and the bar be practicable, the following signals are made at the same time from the station near the light-house and the pilot-staff on the castle of San João da Foz:

Red flag. All vessels in sight can approach the bar.

Red flag with blue pennant above. Vessels drawing 10 feet can approach the bar.

Red flag with blue pennant underneath. Vessels drawing 12 feet can approach the bar.

Blue pennant. Vessels drawing 14 feet can approach the bar.

Red flag accompanied by reports of a cannon. Vessels are urged to approach. In this case the greatest attention should be paid to the signals of a pilot in a boat inside the bar.

One or more reports of a cannon without flag or pennant. No vessels can enter. Keep at a distance.

Life-boats.

A society at Oporto for the rescue and preservation of wrecked seamen, and an establishment with life-boats and apparatus for reaching vessels in distress, exists on the banks of the Douro, just within the bar.

Anchorages, outside.

The anchorage outside the bar is good in 10 to 14 fathoms, with the light-house bearing NE. by E. ½ E., and is often used in summer by vessels wishing to communicate with the shore, or awaiting a favorable opportunity to enter. On the above bearing vessels avoid being dragged by the current in calm weather. If bad weather is expected everything should be in readiness to slip, as the swell, rising suddenly, renders it sometimes dangerous and even impossible to weigh. The Leichoes should bear about NNW.

Anchorages, inside.

There is a bight on the south bank of the Douro, sheltered by Cabedello point, and near the south dike, where small vessels can moor in summer, rings being let into the rocks for that purpose; but the best anchorage is in the bight of San Antonio, opposite the western part of Oporto, where the freshets cause an eddy. Vessels should let go as near the convent as possible, not allowing the dome of the Serra convent to be seen outside the quay. There is no danger of grounding here at low spring tides. A good berth for a vessel of war will be to bring the wine company's store (a white house) on the starboard bow, and the red east gate of the Cavaco garden-wall abreast the starboard gangway. It is customary to make the starboard bower-cable fast on shore. The holding-ground in the stream is very loose; however, a bower is usually laid out there at a long scope for the off strain. As the stream swells, heave gradually inshore until most of the starboard cable is on board. In this position but little strain is experienced, and the port chain will bury itself in the mud, which is soft and deep.

In summer, vessels anchor off the fountain at the foot of mount Rabida, merchantmen anchoring above and below the fountain, with two anchors down and two cables secured on shore. There is more water here than at the other anchorage.

Dangers. Besides the dangers already mentioned, which lie immediately within the bar, there are several others off San João da Foz and farther in.

Middle rock is about midway between the sand-spit from Cabedello point and the eastern end of the north dike in the channel.

Cruz de Ferro is a rock about 1 cable S. by W. ½ W. from Anjo, marked by a stone column named Pilier. Between the Cruz and the reefs of Anjo are a number of boulders, uncovered at low spring tides.

At 1 cable E. of the Cruz are the Arribadourós, and between are two other rocks, and 1 cable to the northeastward of the Cruz is a reef of rocks, named Eira, with 3 to 6 feet water over it at low water.

The Needle (Agulha) and Burgo rocks lie E. and W. of one another to southeastward of the Cruz, and farther up the river there are 3 ledges to be avoided by vessels drawing more than 12 feet. The first is in line with the domes of Anjo and Foz, the second in line with the dome of Foz and the cross of Anjo church, (San Miguel,) and the third is the continuation of an irregular bank extending from Lazaretto point, but vessels should never near the southern bank of the river.

Manifests and bill of health. Masters arriving at Oporto should be provided with a bill of health and manifests in duplicate, one copy to be sent under seal to the director of the customs. These manifests should indicate exactly the number of packages, with the marks and contents of each, and the value of the goods. Both papers should be indorsed by the consular agent at the port of departure, or by one of the nearest neighboring country, or, in the absence of any consular agent, by the local authorities, with a declaration of the absence of such agents. At the visit of the custom-house officer the master must declare all tobacco that he has on board for the use of the crew, under a penalty of fine and imprisonment. He must also declare any articles received after sailing, all stores on hand, as well as the quantity of provisions.

Directions.

To give sufficient directions to a stranger for entering the Douro is impossible, for the channel is so intricate that even with a considerable acquaintance with the place much care and promptitude are requisite, and most particularly with regard to the helm.

The general route of the pilots, however, is as follows: with a favorable wind and smooth sea, at half-flood or high water, approach the bar with the southern belfry of Lapa convent and Santa Catharina church in line about ENE. ¾ E. There are then three bearings, either of which may be taken to cross the bar and clear the first barrier of dangers; they are: the two new beacons in line, or the dome of Anjo and the far beacon in line, or Anjo and the Casa da Quinta in line. When south of Foz castle the north bank is neared; when the north dike is passed, head nearly south to cross the second bar west of the Agulha and Cruz rocks, and when about ½ a cable from the south dike the course is nearly E. by N., so as to keep the channel and gradually approach the northern bank until Lazaretto point is rounded. No directions now published are reliable for this river, as the leading marks have been changed in the last few years and full information regarding them has not been obtained. Besides the above route vessels are often piloted between the Cruz rock and the battery of Anjo, and also just south of the Cruz.

Coast.

From the bar of Oporto the coast trends S. by W. ½ W. for 58 miles to cape Mondego. Almost the whole distance is a sandy shore, but some 13 or 14 miles inland a range of hills, called the heights of Feira, rising from the banks of the Douro, extend south, and at 18 miles to the southward they become more elevated, and form the peak of Ornellas or Carregoza, 3,972 feet high, which may be seen 28 miles from the coast. The hills become less elevated as they continue thence to the southward, where they unite with the mountains of Saude and Talhadas, and these join the high peak of Caramulo, which has an elevation of 3,542 feet, and whose summit is covered with pines.

These mountains run almost parallel to the coast, and Caramulo, which slopes gradually to the south, can be seen 45 miles, or 20 miles westward of the coast near Aveiro, for which and Oporto it is a good mark, and the only distinct object to be seen above the sandy plain of the coast. The configuration of Caramulo is so like that of Ornellas that it is necessary to determine well the latitude to avoid mistake. The former is estimated to be in lat. 40° 33′ N., and the latter in lat. 40° 51′ N.

Immediately south of the bar of Oporto the shore trends first SSE., then S. for about 3 miles, and then SSW. This curve, about 2 miles deep, forms the bay of Santa Catharina, near the middle of which empties the Gopelha river, after watering the country about the village of Santa Catharina near its mouth. The shores of the bay are rocky and the land moderately high. Sureira rock is near the shore and off the northern part of the river's mouth.

From the first fishermen's huts, named Os Espinhos, situated 41° N. and 8 miles S. by E. from the bar of Oporto, the sea-shore is a sand-beach, with huts thinly scattered over it. One noticeable building is the hermitage of Nossa Senhora da Aparecida, near a brook and at the water's edge. There is another remarkable building, called Casa Branca, about 6 miles south of Os Espinhos, and 4 miles north of Ovar. East of Casa Branca, 4 miles inland, on a declivity, stand the town and castle of Feira, easily made out from sea in clear weather. The heights of Feira are seen for a long distance, and are midway between the bar of Oporto and Aveiro.

At 17 miles S. ¾ W. of Casa Branca lies the new bar of Aveiro. On this part of the coast there are six important fishing establishments, distinguishable by their barracks or huts grouped together near the water's edge. It is safe all along, and has from 6 to 8 fathoms water at a short distance out. (In 1835 a supposed shoal covered with less than 10 feet of water, was reported in lat. 40° 35′ N., 13 miles from shore, but it has never been found, and probably does not exist.) In foggy weather, if the peaks of Caramulo and Ornellas are not visible, it is difficult to determine position by any landmarks, these peaks and the tower of Aveiro being the only remarkable points on this low and sandy coast. The mists and sand-clouds raised by the heat and wind often make it difficult to see the mountains, so that it is necessary to have a good latitude when looking for the bar of Aveiro, which is 26 miles W. by N. from the peak of Caramulo.

Vouga river.

The Vouga river rises in the NE. part of the province of Beira, and after a course of about 48 miles empties into the sea at the new bar of Aveiro, fertilizing in its course one of the richest provinces of Portugal, and facilitating the sale and exportation of its products by the convenience it offers to navigation. Near the sea it forms a basin more than 20 miles long, but narrow and covered with islets, which lie parallel to the coast and are separated from the sea by a tongue of sand varying in breadth from ½ to 2 miles.

The entrance of the river or the new bar of Aveiro is about 27 miles N. by E. ½ E. from cape Mondego, in lat. 40° 38′ 30″ N. It is kept open by a solidly constructed dike about 1 mile south of the hermitage of San Jacinto, and gives access to the different arms of the river, the two most important leading one to Sousa and the other to Ovar. The first is 6 miles long to SSE., and the second 12 miles long to NNE., and passes before the city of Ovar, which is on the east bank of the basin. This city, more important than Sousa by its commerce and fisheries, numbers 10,000 inhabitants. Feldspar, for the manufacture of porcelain, and other refractory earths are found here.

The dike has already greatly improved and made an excellent port of the river. The entire channel to Ovar is a safe and commodious anchorage, and many vessels drawing from 14 to 17½ feet find an excellent shelter there. There is less water in the arm leading to Aveiro, although enough for the *diates* and other small vessels when loaded to go as far as El Quadro, near the city.

Aveiro.

Aveiro is built on a marshy plain on both banks of one of the arms of the Vouga, a little more than 5 miles from its mouth, and on such low land that it can only be seen on a near approach. It can be reached by several channels that intersect the basin of the Vouga. Aveiro, formerly of great commercial importance, now numbers only about 4,000 inhabitants, engaged in fishing and working the salt-marshes about the city. Kaolin is also found, and at Vista Alegre, near Aveiro, there is pottery and glass ware. Some few small vessels are also built there. It exports from 6,000 to 7,000 cases of oranges every year, and the oysters of Aveiro are famous.

Bar. The width of the bar varies from ½ to 1 cable, being wider in winter than in summer. It is composed of banks formed by the wash of the Vouga, driven back by the sea, and extends about 2 cables to seaward, and has on it from 13 to 16½ feet of water at high spring tides; immediately outside the bar there is a depth of 6½ fathoms, and in the channel (which is from 109 to 218 yards wide) between the dike and the north shore there are from 3½ to 6½ fathoms.

In 1867 the bar was 8 cables west of the signal-tower, and retained that position for three years; the deepest channel was E. and W. with the tower, or in the direction of the dike. The channel extends farther out, in proportion as the bar gains to seaward.

Landmarks. The hermitage of San Jacinto, near the coast, half a mile north of the bar, is a good mark, though difficult to make out more than 4 miles at sea, and as the coast is very low here, a slightly conical tower is built on the southern parapet of the fort at the eastern end of the dike; it is 50 feet high and 60 feet above the sea; it is whitewashed and is visible 10 miles. The pilots signal from this tower. There are also two stone pyramids placed on the beach, one N. and the other S. of the bar. The northern is on North Cabedello; it is 10 feet high, and its summit is 43 feet above the level of the sea; it is 1,312 yards NNE. of the end of the dike, and 273 yards from the sea. The southern is on South Cabedello 437 yards S. of the dike and the same distance from the sea-shore; in form and height it is similar to the other, and both are whitewashed so as to be seen a long distance.

Light. It is proposed to establish a light-house at the western extremity of the dike on the coast south of the new bar of Aveiro.

Tides.

The establishment on the bar is about 2h. 30m.; the rise is from 7 to 11 feet, but at the town of Aveiro the rise is but little more than 4 feet. The tidal currents are very strong, the ebb being always longer and of a sufficient velocity to occasionally prevent the entrance of vessels. For this reason, no doubt, the fishermen haul their boats up on the beach N. and S. of the bar, and avoid the necessity of crossing it.

Directions.

The bar of Aveiro is relatively good, since there are no banks on it, and it is very short, but it is well to take a pilot before entering, on account of the velocity of the current, and no bearings can be given on account of the constant shifting of the sands. When the sea is smooth the entrance is easy and it is accessible with all winds, except the SE., which cause a heavy sea, and during an easterly gale. When the pilot-boats are prevented from going outside, a vessel drawing 9 feet of water may run for the bar at $\frac{3}{4}$ flood, provided the wind be favorable and sufficiently strong to give good steerage-way. A pilot-boat is then stationed inside the bar, and a pilot on the tower makes the signals simultaneously with the one in the boat. It is necessary to pay careful attention to the signals from the tower and the boat, in which the pilot makes them with a *red* flag on a movable staff. When the staff is inclined to N. or S., steer in the direction of the incline, and when the staff is upright keep straight ahead. The lookout on the tower repeats the signals, and it is well to rely chiefly on the latter. In very bad weather two boats are stationed inside the bar to aid any vessel in distress. In one of them is a pilot, who comes on board as soon as the ship is inside, and takes her to the anchorage. When a *red* flag is hoisted on the tower and remains hoisted, it indicates that vessels can enter. If the flag is hoisted and immediately hauled down and a gun is fired at the same time, vessels must put to sea at once to avoid being wind-bound, and not return until a more favorable time. With a smooth sea and fair wind, the *red* flag is hoisted at low water to denote to a vessel that it should approach and keep near the bar; the flag is then hauled down until the water is high enough on the bar, when it is again hoisted. If a shot be fired and the flag left aloft, the vessel should make more sail to profit by the tide. The land should not be neared to make the bar with a gale from NW. to SW. In fine weather vessels may anchor outside the bar to wait for the tide.

Mira. South of the new bar of Aveiro the shore is a long sand island until the old bar of Aveiro is reached, 10 miles S. of the new. The old bar serves as an outlet for the lagoon of Mira, at the head of which stands the town of the same name. Near the entrance are several huts on the shore across from the town, which is 6 miles in the interior. Most of the population are fishermen.

Coast. From the old bar of Aveiro to cape Mondego, the coast, which trends S. by W. ½ W. is low throughout, forming an immense sandy plain sometimes 4 miles wide, broken only by a few fishermen's huts 9 miles north of the cape and by the houses of Tocha. Behind this zone of sand the land is very high, particularly at the Serra de Bussaco, whose peak stands about 12 miles SW. by W. from that of Caramulo, with which it is united. About ESE. from the peak of Bussaco, 1,827 feet high, are the Cantaros or high peaks of the great chain of the Estrella mountains, the loftiest in Portugal. The highest part, which attains an altitude of 6,544 feet above the level of the sea, is 50 miles inland and in clear weather is visible 36 miles at sea.

Caution. The coast between the new bar of Aveiro and cape Mondego is more dangerous than is generally supposed. It is stated that at a little distance from the sand beach shifting sand-banks are formed by either winds or currents. These banks are not fixed, but wash away and re-form at other points, and vessels are known to have been wrecked on them. On this account it is recommended to keep at least 3 or 4 miles from shore, in going to Figueira, until south of cape Mondego.

Cape Mondego. Cape Mondego is the western extremity of mount Buarcos, which extends to the E. for 4 or 5 miles. It has a watchtower on its flat summit at an elevation of 700 feet, visible 30 miles. At this distance the mountain looks like an island, and must not be confounded with Burling island. The cape itself is a sand point with a reef extending more than a cable's length to the south. The sand beach stretches for several miles N. and S. of the cape, and helps to distinguish it. The bay of Buarcos is a little sheltered by the reef off cape Mondego.

The soundings abreast and near the cape are 7 fathoms.

A little farther out 20 fathoms, and at 7 miles distant 30 fathoms, with brown sand and shells. When standing off, on account of bad weather, vessels should not come within 30 fathoms abreast the cape, or 40 fathoms when to the northward of it.

Light: Lat. 40° 11′ N.; long. 8° 54′ W.

At the western extremity of cape Mondego, the most prominent point on the coast of Portugal, between cape Roca and the Minho, there is a stone tower on which is a lantern with a *fixed white* light, 302 feet above the level of the sea and visible 20 miles in clear weather. It shows the position of this low point, and serves as a landmark for Figueira and Buarcos.

Buarcos bay.

On the southern side of the cape the coast forms with point Santa Catharina, on which stands the fort of the same name, a bay which might be called the outer port of Figueira. The land is tolerably high between the cape and the village of Buarcos, itself at a considerable elevation, and about 1½ miles from the cape. The village is inhabited by fishermen, and from here the pilot-boats put to sea with pilots for Figueira, but the heavy swell that breaks on the beach often prevents them from going out. Fortim, a collection of houses and huts, is farther south on a low beach between Buarcos and Santa Catharina.

La Cala.

The village of Buarcos is in a little cove, called La Cala, sheltered by reefs extending to the SW. Vessels anchor off the village in 5½ to 6 fathoms, sand, when the wind is from N. to S. through E., and wait for a favorable time to cross the bar of Figueira. In fine weather vessels are loaded and discharged there, but with winds from NW. and W. to S. it is very exposed. In going in to this anchorage the reef of cape Mondego, described above, should be looked out for. Work has been commenced in a coal-mine near Buarcos.

Life-boat.

There is a life-saving station at Buarcos, but it is not yet provided with proper equipments. The fishermen go out in their own boats to aid vessels in distress.

Mondego river.

The Mondego, the largest river that rises in Portugal, rises in the Estrella mountains, traverses the country of Coimbre, and after a course of 90 miles forms the harbor of Figueira, and empties into the sea 3½ miles SE. of cape Mondego by the town of that name, or Figueira, which is on the northern bank ⅓ of a mile from its mouth. It is navigable for a considerable distance, (42 miles,) and flat-boats go as high as the mouth of the Dao, above Coimbre.

The harbor of Figueira, south of the town, would be a very fine one if it were not almost entirely obstructed by shoals of shifting sand. The entrance to it, 1½ cables wide, is between the rocky point of Santa Catharina, crowned by a fort and terminated by a reef stretching a little to the W., and the sandy point of Cabedello, and is inclosed in that arm leading to Lavos by a dike.

Work is in progress to better the harbor by building a dike, commencing at Murraceira island, which will extend to within 219 yards of the one that already surrounds the western shore of the southern arm or Lavos river. It is now nearly finished. This dike, with one to be constructed off the north bank and parallel to the town, will encase the river and clear the channel, especially if, as is projected, the head of the north dike is extended beyond the fort, like the one on the Cabedello. The channel will run about E. and W., and the effects of the dikes are already sensible on the bar, whose present limits are point Santa Catharina, and the head of the new south mole.

Figueira. The town of Figueira, on the north bank of the arm of the Mondego river that passes north of Murraceira island, possessed, in the past, great commercial importance. But its commerce is now much reduced, the railroad from Lisbon to Oporto absorbing all the trade, and doing away with a portion of the river navigation that brought here the products of Coimbre and the surrounding country. Yet there are still exported to Brazil and other countries Beira wines, vinegar, and salt, manufactured chiefly from the salt marshes of Murraceira island. Millstones are also exported. The number of inhabitants is about 4,000. Provisions, water, and means for repairing damages are available. Its position between Lisbon and Oporto, and its communication by the Mondego with Coimbre, give facility for obtaining anything that may be desired from these cities.

Bar. The bar formed by the deposits washed down by the river and driven back by the gales from seaward, is shifting, and at times entirely closes the mouth of the river. Its greatest depth in a normal state is about 14½ feet at high spring tides. During the freshets of the Mondego, when the strength of the current follows the north bank of the river, and point Santa Catharina, there is usually more water on the bar, sometimes, indeed, as much as 9 feet at low-water; but when it follows the southern bank the current is divided by the channels that the banks form, its force is diminished, and then even the smallest vessels are unable to enter. Generally, however, vessels drawing not more than 9 feet can enter at ¾ flood with a fair wind and smooth sea.

Tides. The establishment at Figueira bar is 2h. 30m. The rise of the tide is from 7 to 11 feet approximately.

Directions. The best time to cross the bar is with the wind from N. to S. through W., with a moderately smooth sea, and about the time of full or new moon. Under these circumstances vessels drawing 12½ feet can enter at high water. But, on account of the velocity of the tidal-current and the uncertain state of the bar, a pilot must be taken. They usually come out from Buarcos village when the sea allows it. After crossing the bar, head for the dike that touches Murraceira island, leave its western extremity to starboard and anchor in the north arm abreast of the town of Figueira. This dike separates the Mondego into two arms, which re-unite about 3 cables from the entrance. The southern arm is called Lavos river, and leads to the town of that name by a very crooked channel.

Pilots. When the pilot-boats cannot go out signals are made to vessels entering by hoisting a *red* flag at fort Santa Catharina, on the north side of the bar. Should the flag remain hoisted vessels can enter; but if, after a moment, it be lowered or hauled down it denotes that the tide is not sufficiently high, and that vessels should remain at reasonable distance until the flag be hoisted again. *The report of a cannon* when the flag is not hoisted warns vessels to put to sea as soon as possible to avoid being embayed, to return when the weather is more favorable; but the *report of a cannon with the flag hoisted* is a signal to make all sail possible to profit by the tide. In approaching the bar, therefore, close attention should be paid to the signals from the fort and to those from the Figueira pilot-boat inside the bar, where the pilot signals with a flag attached to a movable staff. When the staff is inclined to N. or S. steer in the direction indicated, and when it is upright keep straight on.

As a rule, vessels should not enter without a pilot from

Buarcos, but if it is necessary to do so, assistance may be relied upon from the pilot-boats of Figueira, which are stationed inside the breakers. Vessels at sea wishing to communicate with the shore can do so by the universal signal code.

Outer anchorage.

With winds from the land vessels can anchor about 5 miles S. of cape Mondego, in from 7 to 10 fathoms, sandy bottom; but should the wind haul to the S., vessels should weigh and put to sea at once, because the westerly gales usually commence at the south, raise a very heavy sea, and sometimes blow for a long while.

Coast.

From Figuera the coast trends SSW. 16 miles to the Vieira River, and 19 miles farther on stands the church of Nossa Senhora de Nazareth, on the northern point of the little bay of Pederneira. The sea-shore is a long uniform plain of little else than sand, but the land rises in the interior until it forms mountains of moderate height. This flat coast is dotted here and there with groves (pinhals) of pine and ash, the largest being the pinhals of Leirosa and Vorso, between which lies Recovo lake, which is connected with the sea by a tortuous channel, near whose mouth there are a few fishermen's huts. The entrance to this channel, on the boundary-line of Beira and Estramadura, is in about 40° 5′ N. lat. Farther south are the forests of Concelho and Leiria, separated by the Vieira river. These two forests together extend 13 miles N. and S., and are about 1 or 2 miles from the sea-shore, and were planted to shield the fertile lands of the interior from the sand driven from the beach by the violent W. and NW. winds. They can only be seen for 4 or 5 miles, but are the only prominent objects between Figueira and Vieira along the coast.

Port of Paredes.

The port of Paredes is a little inlet only sheltered from the land-breezes. The Leiria river, which passes near the town of the same name, and the Vieira, empty into the sea at this little port, which formerly was of some importance, but is now so completely obstructed by sand-banks that the inhabitants are abandoning it for Pederneira.

Small coasters which load up with wood anchor off the Vieira river in from 17 to 18½ fathoms, sand, about ¼ of a mile from the beach. They anchor also off the chapel of San Pedro de Muel, 8 miles farther south, and off that of Nossa Senhora da Vittoria, 4 miles farther; but they can only anchor in fine weather and with the wind from the land, and put to sea at the slightest appearance of wind from seaward. All this coast is low and sandy, but safe, having from 9 to 14 fathoms a short distance off shore. The land farther inland is moderately high.

Pederneira bay. The north point of Pederneira bay, formed by a rocky point considerably higher than the low, sandy coast, is abrupt, and projects a mile to the SW. On its outer part is the fort of San Miguel, which defends the anchorage. On its summit, 360 feet high, stands the chapel of Nossa Senhora de Nazareth, whose sharp and tall spire forms a good landmark by which to recognize this place. This church, surrounded by houses, giving the appearance of a village, cannot be mistaken for any other building on the coast, but it cannot be seen any great distance, as it is hidden by a grove of pines on the NW. slope of the point, planted to protect the church and houses from the driving sand.

Small vessels anchoring in the bay of Pederneira are sheltered from the E. winds, but exposed to all the others. A small stream, called Alcohaça, empties into the bay.

Pederneira. The town of Pederneira is built partly on a hill, which unites with the heights of Nazareth, about 1 mile from the church and the same distance from the shore. It numbers about 2,000 inhabitants, almost all fishermen. They haul their boats up on the beach and stow their nets, &c., in sheds along the shore.

Coast. South of Pederneira the coast is sandy as far as mount Alto de Facho, a high and precipitous hill, with ruins showing at its summit; it is then a succession of steep cliffs as far as lake Obidos, about 12 miles SSW. These cliffs border the mountains of Serra Bouro, which rise abruptly from the sea, commencing at San Martinho bay and extending about 6 miles SW. by S. to the opening of the lake, where they terminate in a hill 522 feet high, named Alto de Bouro. All that part of these mountains that touches the sea is jagged and sharp, and the coast is very dangerous.

Port of San Martinho. The port of San Martinho, or St. Martin, is 6 miles SW. by S. of the church of Nossa Senhora de Nazareth and 18½ miles ENE. of the Burling islands. It is now so obstructed by sand-banks that there is never more than 9 or

10 feet in a small portion of the middle of the bay. It is only visited by small coasters, which are very much exposed during NW. winds, and the swell raised by these winds tosses them violently about until they are stranded at low water.

St. Martin. The town of St. Martin, numbering 1,000 inhabitants, is in the NE. angle of the bay on a height on the north bank of the Vao brook. Another brook empties into the SW. portion of the port. There is a ship yard at St. Martin, where 50-gun ships have been built; bitumen and pummice-stone are found in the environs, and recently a railway 23 miles long has been constructed to transport the resin, pitch, and tar from the pine forests of Leiria.

Bar. The bar lies between two rocky points, 164 yards apart; the northeastern is low and capped by a fort; the higher, to the SW., is crowned by a hermitage dedicated to Santa Anna. The channel of the bar runs NW. and SE., and boats wishing to enter should steer for the gap, keeping outside the capes until boarded by the pilot, unless the captain is familiar with the port. A chain of rocks fringing the southern point of entrance must be looked out for.

Tides. The establishment in the bay of St. Martin is 2h. 45m. The tide rises 11 feet at high springs.

Salir do Porto. This little town is near the southern shore of St. Martin's bay, on the slope of a hill 350 feet high, a continuation of mount Bouro.

Lake Obidos. Lake Obidos, lying at the southern extremity of the Bouro mountains, 6 miles NE. by E. ¼ E. of the Ilha de Terra, has an irregular shape and stretches more than 8 miles to SE. It is connected with the sea by a little narrow, crooked channel not more than 45 to 55 yards wide, which is closed during the summer. In winter the waters of the lake, reinforced from several water-courses, rise, and the passage becomes practicable. The lake has an abundance of excellent fish, and the fishing gives occupation to a number of flat-boats that belong to various establishments on the shore.

Obidos. The town of Obidos, which gives its name to the lake, is 5 miles inland on the banks of the Vargem river, which empties into the lake, and contains 4,000 inhabitants.

Caution. The entrance to the channel of lake Obidos is sometimes mistaken for that of port St. Martin, but this error may be avoided by observing that the lake is south of Bouro mountains, while port St. Martin is north. South of lake Obidos the coast trends to the SW. and terminates in a beach bordering moderate heights intersected by ravines.

Peninsula of Peniche.

The peninsula of Peniche is a rocky plateau 1½ miles long and 1 mile broad. It is 112 feet high and nearly flat on the summit. It is steep all around, and has but a few breaks in the general regularity of its sides. It projects to seaward, and is joined to the mainland by an isthmus of sand ¾ of a mile wide, which is mostly submerged in high spring tides, and completely so at equinoctial spring tides, when the winds are strong from north or south. The peninsula then appears to be an island. A line of fortifications extends along the SE. face of the peninsula, and a canal, which boats can enter from the south at high water, leads to the town of Upper Peniche.

Peniche.

The upper town of Peniche is toward the northern extremity of the peninsula, and the lower town at its southern extremity. Both are within the wall that surrounds the eastern portion of the peninsula, terminating at fort da Luz at the north, and the citadel and fort das Cabanas at the south. These two towns, deprived of means of communication with the interior, have a population of 3,000 persons, almost all fishermen. A few boats are built there. Imports in 1860 were valued at $20,357, and exports at $17,670.

Cape Carvoeiro.

Cape Carvoeiro is the western extremity of the peninsula. It is a rocky cliff, perpendicular on the N. and S., and with a high isolated rock at its foot. At the southern extremity of the cliff, or at the SW. end of the peninsula, stands fort Victoria. Besides this fort, the hermitages of Nossa Senhora de los Remedios, de Santa Anna, San Francisco, and others are on the peninsula.

Light: Lat. 39° 21′ N.; long. 9° 24′ 16″ W.

In 1790 a light-house was built on cape Carvoeiro, a short distance NE. of fort Victoria. It shows a *fixed white* light 182 feet above the level of the sea, visible 15 miles in clear weather. The tower is square and 94 feet high.

Anchorages.

In the bay north of the isthmus, between point Baleal, (beyond which is a chain of islets terminating in the Ilheo de Fora,) and the NW. point of the peninsula the anchorage is not good, for the bottom is very rocky and all winds from the northward bring in a heavy sea. It is the same case with the little bay or cove Portinho d'Area, open to the NW., and beyond the eastern point of which lies the big rocky islet of Popõa, about 150 feet high.

Peniche bay. Peniche bay, on the south side of the isthmus, between fort Victoria and the rocky point on which stands fort Consolação, offers a good shelter with winds from E. to N. and even as far as NW., in 6 to 7½ fathoms water. The bottom is generally rocky, with some sand-patches. In anchoring, vessels should let go the anchor as soon as the arch of the bridge between the fortifications and an isolated rock in the east commence to open. Small boats can enter the canal or ditch of the fortifications from the south at high water.

Caution. In fogy weather the peninsula of Peniche looks like an island; vessels have mistaken it for the Burlings and been wrecked on the isthmus. This error may be avoided by noting the fact that, when the Burling island is sighted, the Farilhões, 4 miles to the northward, are seen at the same time, and that the width of the passage between the Burling island and the peninsula is much greater than the apparent opening east of the peninsula, from whatever position it is seen. Beyond this the position and height of the light-houses should serve as a guide; that of cape Carvoeiro is at the end of the cape, and its base is about 88 feet above the level of the sea, while the base of the Burling island light-house is 265 feet above the same level. At night the difference of the lights themselves will prevent error; and the soundings may also assist. North and south of and beyond Peniche, they vary between 13½ and 41 fathoms, and between the Farilhões and the coast of Obidos, they are the same, but outside of the Farilhões they increase suddenly to 91 fathoms.

The Burlings. This is the name of a group of islets lying about 5 miles NW. of cape Carvoeiro, and extending about 4 miles to seaward. Burling island, the largest, of oblong, irregular, and very indented outline, is about 8 cables long from NE. to SW., 4 cables wide, and has an average height of 256 feet; it is flat on top and almost entirely surrounded by perpendicular cliffs. An isthmus about 128 yards wide divides the island into two unequal parts, the northern called Velha island, and the southern Berlenga or Burling island. A portion of the island is cultivated, but the only inhabitants are the garrison of the fort and the light-house keepers.

Light: Lat. 39° 25′ N.; long. 9° 30′ 06″ W.

On the middle of Burling island there is a square tower 100 feet high, on which is shown, at 365 feet above the level of the sea, a *revolving white* light, revolving once in 3 *minutes*, visible 25 miles in clear weather. This light-house is 5¾ miles NW. by W. from the light-house of cape Carvoeiro.

Inlets.

There are two little narrow inlets between the two portions of the island; the one to the NW., Carreiro dos Cações, (the frying-pan,) is about 2 cables wide and bordered by high perpendicular cliffs, with a little beach at its head. There is a depth of 5 fathoms at the entrance of this inlet, and 3 fathoms near the isthmus, against which the sea breaks very heavily during westerly winds.

The inlet on the SE. coast, Carreiro do Mosteiro, (the monastery,) is little more than ½ a cable wide, but has a good beach, on which landing is easy. There is a depth of 8 fathoms at the entrance, diminishing to 2 fathoms near the beach.

On an islet, a little more than 2 cables SW. of this inlet, off a small rocky cove, is the little fort of San João Baptista, which is connected with the island by a bridge, from which a road leads to the summit. In fine weather boats enter the cove on the north side of this islet, named Carreiro de Fortaleza or de Portinho.

Water.

There is a little spring of good water in the Carreiro de Fortaleza, and another in the Carreiro de Mosteiro, where water can be procured if needful.

Dangers.

Burling island is surrounded by rocks. Serra da Velha is a little, isolated, and high rock, separated from the NE. end of the island by a channel 2½ cables wide, named the Corredouro, which has 7 fathoms of water in it. Three cables NW. by N. from this islet lie the rocky banks of Rinchão, which uncover at low water, and which form a channel similar to the other with the northern extremity of Burling island. The dangerous rock of Sota Catalão, uncovered at low water, is about 1 cable from the south point of the island, and Pregos rock, similar to the others, is 87 yards from the southwestern extremity.

Soundings.

The soundings around Burling island and beyond the rocks above mentioned vary from 13½ to 16 fathoms, with a generally rocky bottom, but ½ a mile SW. of the island is a ledge of rocks, named Atafanas reef, which has only 9 to 10 fathoms over it.

Anchorage. Vessels anchoring under the SE. coast of Burling island are sheltered from winds from NNW. to SW. through W. A good anchorage is about 1½ cables from the island in 12 to 14 fathoms, sand, with fort San João Baptista bearing W., and the middle of the islet Serra da Velha bearing NE. by N. But vessels should weigh at the slightest appearance of wind from seaward or from the south. In making this anchorage vessels should keep well clear of the north and south ends of the island to avoid the rocks and dangers already described.

Estellas. The Estellas are three islets surrounded by rocks and banks, the middle one of the group being 1½ cables from Burling island, NW. by W. ½ W. from the light-house. They are steep and jagged; they extend ¾ of a mile NE. and SW., and 4½ cables from E. to W. All are above water. The largest is 2 cables in circumference; the Estalão is north of and near it, and the Manoel Jorge west of it. Six rocks reach SW. from the largest for 4½ cables, the chief one of which, named Broeiro, being joined on the NE. to a reef which uncovers at low water. The Medes are 2$\frac{7}{10}$ cables E. of the principal group. These two rocks are about half a cable's length apart and lie N. and S. of one another, and 1$\frac{6}{10}$ cables SW. by W. of the south Mede is a dangerous reef.

The channel which separates the Estellas from Burling island is 6 cables wide and from 9 to 16½ fathoms deep, rocky bottom, but it is dangerous, on account of the swift currents setting generally to SSE. or on the Burling island, and the bad rocky bottom does not allow a safe anchorage in it.

The Farilhões. The Farilhões are a group of rocky islets covering a circular space about ¾ of a mile in diameter. They are almost perpendicular and very much broken, and Farilhão Grande, which is nearly round, with a diameter of 2½ cables, is as high as Burling island, from which it bears NNW., distant 3½ miles. There is 1 rock NE. of Farilhão Grande and 4 SW. of it—Cova rock, lying E. of the southernmost of these latter. The two Forcados are ½ a cable apart and are the farthest to the SW. They are 7 cables from Great Farilhão, and the sea breaks on them at low water. A reef with 6¾ to 11 fathoms water on it extends 1½ miles NE. by

E. ½ E. from Great Farilhão. It is narrow, and soundings near its edge vary from 18 to 36½ fathoms, rocky bottom, and finally the small Remela reef is about ½ a mile NNW. of the Great Farilhão.

There is a tolerable anchorage off the southeastern portion of this chain of rocks, used by the fishermen. It is a good shelter in winds from NNE. to WSW. through W. The boats enter the bight between Farilhão da Cova and the more northern islands, where they have from 6½ to 7 fathoms gravel.

Channels. The channel between the Farilhões and the Estellas is from 13½ to 45½ fathoms deep, with sand, rock, and gravel bottom, and its navigable width is 2½ miles; but the current already spoken of sets with velocity from the former to the latter and necessitates great caution. In using this strait vessels should have a smooth sea and wind enough to keep good steerage-way.

The channel between Burling island and the mainland is deep and perfectly safe. Half a mile from land on each side there is depth of 15 fathoms, increasing to 27 fathoms, with a bottom of sand, rock, and gravel. The Farilhões and Burlings can be seen 24 miles from the deck of a ship, and the peninsula of Peniche almost as far. With a little care and reference to the preceding descriptions they cannot be mistaken for one another, so that this channel can be used at all times when these points are visible. But in sailing along this part of the Portuguese coast in a thick fog great care must be taken not to run upon these islands, because they are so far off shore and the depth of water near and around them is so great that the lead is not a sufficient guide for their avoidance when they cannot be seen.

Coast. From cape Carvoeiro, after forming the bay of Peniche, the coast trends S. by W. ½ W. in almost a straight line for 35 miles, to cape Roca. At fort Consolação, 3 miles from the former cape, and north of which lies the town of the same name, the beach ends, and perpendicular rocky cliffs interspersed with small beaches commence and continue as far as the town of Lourinham, in front of which is the beach of Area Branca, 2½ miles long. The river dos Palheiros, which passes near the town of Lourinham, flows through this beach, south of which the shore is again precipitous, and so continues to the gap of Porto Novo, where the little river Alcabrichelle or Maceira empties into the sea. This gap is formed by the heights of Valango, which are near the shore and are 354 feet high. At this part of the coast the town of Vimeiro, on a hill, and Maceira, near which flows the river of the same name, can be seen 3 miles inland.

South of Porto Novo, above the beach of Amoeira and at least a mile inland, stands a hill 250 feet high, on the brow of which is the city of Pavoa, and farther east is the remarkable convent of Penafirme. Then comes Praïa Formosa, (beautiful beach,) so named on account of its length, regularity, and beauty; it extends 1 mile SSW., ending at Sizandro brook, which passes near the town of Torres Vedras, 6½ miles inland. South of this brook, at point Foz, the cliffs recommence, broken by the beaches of Genetias, Assenta, and Barcos, and 1 mile east of the latter stands mount Barril, 325 feet high, a landmark for the anchorage of Barcos. The town of Barril is on the southern slope of the mountain. Off the beach of Assenta there are two little anchorages, called the ports of Calada and Barcos. The town of Assenta is at least a mile from the water's edge. Next comes the bay into which the brook of Safarujo flows, defended by fort Santa Suzana; and then Ilhas inlet, a small and rocky cove, into which Ilhas brook empties, defended by fort Milregos, 1½ miles N. of Ericeira.

Mount Junto. The northern portion of the coast just described, whose cliffs are from 260 to 300 feet high, is overlooked by mount Junto, which rises 14 miles inland, and attains an altitude of 2,185 feet; it can be seen 53 miles, or from 38 miles at sea. Its summit is in latitude 39° 10′ N., the latitude of Vimeiro, and it is in the middle of the chain of Junto mountains, extending 9 miles NE. and SW. nearly parallel to the coast, and very noticeable when sailing along it.

Banhos. Point Ericeira is steep, projecting, and crowned by a fort. On the brow of the cliffs, which are here about 130 feet high, stands the town of Ericeira, of about 3,000 inhabitants, almost all fishermen. Banhos cove, with others less important, where the boats anchor, lies at the foot of the cliffs near the town. At Banhos, half a mile south of Ericeira, there is a good beach, where the boats are hauled up, and half a mile farther south there is a gap, through which flows the brook of Porto, which rises in the heights of Mafra. At Ericeira a few boats are built.

Coast.

From Ericeira to cape Roca, 11½ miles, the coast trends S. by W. ¾ W. It is formed of rocky cliffs, from 140 to 400 feet high, with a few breaks for water-courses. At the foot of these steeps lie the small beaches of Maçans and Adraga, 2 miles long, 3 miles N. of cape Roca, and under the Serra da Cintra. Small coasters anchor occasionally off these beaches. The heights of Mafra, 335 feet high, and crowned by a watch-tower, are south of the beach of Areas Gordas. Five miles N. of the cape, and N. of the same beach, fort Santa Maria stands on a cliff projecting to the westward.

Mafra.

The town of Mafra, on the brow of a hill 5 miles ESE. ½ E. from point Ericeira, is remarkable on account of an imposing edifice, which comprises a palace, a convent with a magnificent church, and large towers whose tops are 777 feet above the level of the sea. The façade of this edifice is 827 feet long, the church standing in the middle with the palace on one side and the convent on the other. The principal façade of this remarkable building, which is unequaled on the coast, faces the west, is easily recognized, and can be seen for a considerable distance. The town of Mafra, which takes its only importance from its palace, contains 3,000 inhabitants. Fine red and yellow marbles are quarried in the environs.

Cintra mountains.

The Cintra mountains commence a little S. of cape Roca, and thence rise brusquely and extend 5 miles ENE. Their summits form an irregular indented curve, showing a great number of peaks. One of the most distinct of these, named Pena, 1,735 feet high, is in the most eastern part of the chain. It is distinguishable by the old castle and convent of Pena, now a royal palace. The peak of Peninha, the western extremity of the chain, neither so sharp nor so high, is 1,593 feet high, and on it is seen the little church of Peninha, 3 miles WSW. from the peak of Pena, and S E. by E. ¾ E. of cape Roca. The peak of Monje, 1 mile E NE. of Peninha, also has a building on the summit, and is 1,600 feet high. These mountains are seen from far out at sea, and are an excellent landmark for cape Roca from their proximity to the coast and their steepness on that side. They are sometimes obscured by mist, but in this case the light-house of cape Roca is almost always visible.

Cintra.

The town of Cintra, numbering 4,000 inhabitants, has a charming position at the foot of the peak of Pena, on the

NE. slope of the mountain. It is the summer resort of the aristocracy of Lisbon. All the surrounding country is highly cultivated, on the hills and in the valleys, and is covered with summer residences, gardens, &c., that can be seen for a long distance when sailing along the coast north of cape Roca. Blue marble comes from the quarries of Cintra.

Colares. Colares is as picturesque as Cintra, but of less importance. It is 3 miles west of the latter, on the northern slope of the mountain.

Soundings. Between the Burlings and cape Roca the soundings perpendicular to the coast seem to increase very regularly. As a rule there is a depth of 30 fathoms at 7 to 8 miles from the coast, 45 fathoms at 11 to 15 miles, and 60 fathoms at 20 miles; but then the water deepens rapidly. In approaching cape Roca the soundings near the coast are a little less.

CHAPTER VI.

FROM CAPE ROCA TO CAPE ST. VINCENT.

Variation 21° *westerly in* 1872; *diminishing about* 4′ *annually.*

Cape Roca.

Cape Roca, (or Rock of Lisbon,) the western extremity of Portugal and of the continent of Europe, is a spur of one of the Cintra mountains; it is about 550 feet high, its sides are steep and rugged, there is a light-house on its summit, and at its base are several rocks. Near the cape is a high rock, and farther out, about 4 cables NW. by W., is a reef, on which the sea breaks continually; close off this reef there are 25 fathoms water.

The soundings near the cape give 20 fathoms, increasing regularly to 40 fathoms at 10 miles; between 0 and 15 miles they vary from 40 to 45 fathoms, and at 25 miles reach 100 fathoms. At 10 miles WNW. from the cape there is a bank with 23 fathoms water on it.

At about 4 miles S. ¾ E. from cape Roca is cape Razo, upon which is fort Sinchette or San Bras. This is a low rocky point, with a small shoal close off it, which it is necessary to avoid. Between these cliffs the coast forms a bay bounded by steep cliffs till fort Guincho is passed, and then there is a low and sandy beach through which several small streams flow.

Lights: Lat. 38° 46′ 06″ N.; long. 9° 30′ W.

The tower on cape Roca, about ¼ of a mile NE. of the cape, is a circular building 52 feet high, which displays, at an elevation of 596 feet, an alternately *red* and *white revolving* light, visible 21 miles in clear weather. This light revolves every 1¾ *minutes*, the *red* light lasting 60 *seconds*, and the *white* being a *flash.*

Lat. 38° 41′ N.; long. 9° 27′ 12″ W.

At about 1½ miles SE. by E. from cape Razo is Guia light. The light-tower 2½ cables E. of the fort of N^a. S^a. de la Guia, is square, and displays, at an elevation of 207 feet, a *fixed white* light, visible 12 miles in clear weather.

Lat. 38° 41′ N.; long. 9° 26′ W.

The light of Cascaes is 1 mile E. of Guia light. The tower is quadrangular, with a blue stripe half way up from the base, and it shows, from an elevation of 53 feet above sea-level, a *fixed red* light, visible 5 miles in clear weather. This tower is built on the wall of fort Santa Martha, the western extremity of Cascaes bay. The coast from cape Razo is of steep cliffs with few indentations or prominent points, $2\frac{1}{2}$ miles to fort Santa Martha.

Bay of Lisbon. Between cape Razo and cape Espichel, distant 22 miles SE. by S., the coast forms the deep bight known as the bay of Lisbon, into the northeastern part of which flows the Tagus river. The north coast of this bay is not so high as the south, but is more indented.

Cascaes bay. Cascaes bay is formed by the shore from fort Santa Martha sweeping north, east, and SSE., to Rana point, $3\frac{3}{10}$ miles E. by S. A sandy shore extends around the bay from fort Santa Martha to Velho fort, about $1\frac{1}{2}$ miles; thence it is rocky to Rana point, off which for 2 cables the ground is foul. The town of Cascaes stands on the shore $\frac{1}{2}$ a mile from fort Santa Martha, and between them is fort Cascaes, which is conspicuous, on a high, steep point. The town numbers 2,100 inhabitants; the pilots for Lisbon bar usually reside there, and provisions and water may be obtained. Between Cascaes and fort Velho are several batteries, and there is a fort (Junqueiro) near Rana point.

The anchorage is in the northwestern part of the bay, good in summer during the season of north winds, but exposed to a heavy sea during south winds. Large vessels anchor in $5\frac{1}{2}$ to 11 fathoms water, sand and mud, with Guia and Santa Martha lights in line, and the town open east of fort Cascaes. There are some rocky patches of bottom in the western part of this bay, and all the eastern portion is unsafe.

After Rana point the coast is again low and sandy for 1 mile to fort San Julian on the north point of entrance to the Tagus. This point (Lage) is high, rocky, and projecting to southward, and on it there is a light-house.

The Tagus. The river Tagus or Tejo, of the Portuguese, the largest in the Iberian peninsula, which it traverses from E. to W., and divides into two nearly equal parts, has its source in the Serra Albarracin, on the borders of Aragon and New Castile, in about lat. 40° 25′ N., long. 1° 35′ W. It enters Portugal near Alcantara, above which it is not navigable. Beyond this town it commences to turn to the SW., and after a course of 450 miles flows into the sea 7 miles below

Lisbon. Above Lisbon the Tagus opens out into a large basin from 2 to 7 miles in breadth, affording anchorage to any number of vessels in a convenient depth of water, though hitherto, beyond the city the river has not been of much commercial importance, though it is navigable for vessels of 150 tons as high as the mouth of the Zezere. Abreast Lisbon the river is 1 long mile wide, and at Belem ¾ of a mile, widening thence to the entrance, where it is 1¾ miles across.

From the entrance to abreast the city might be termed the port of Lisbon. Belem castle, on the north bank, 5 miles above fort San Julian, is a prominent feature in entering the river, as it stands on a projecting point, and is nearly insulated at high water. Here the health and customs offices are established, and near them is the quarantine station. Off the castle all vessels are boarded on entering. The church, houses, and straggling quintas of Belem, almost connect it with the capital.

West of Belem are several forts, batteries and villages, and both the north and south shores of the Tagus present a very pleasing prospect from the numerous villages, buildings, and gardens, and the cultivated land.

Lisbon.

Lisbon, the capital of Portugal, on the northern bank and about 7 miles from the mouth of the Tagus, has a population of about 280,000 inhabitants within its own walls and the suburbs of Ajuda, Belem, Junqueira, Lumiar, and Olivaes. The broad estuary of the Tagus forms an extensive and safe harbor, in which the largest vessels can anchor close to the city, and is admirably adapted for commerce.

The city extends for more than two leagues, and rises from the bank of the river in the form of an amphitheater, being built on a succession of hills, the highest being the Estrella on the west and the castle hill on the east. Most of the streets are steep, irregular, badly paved, and dirty. One part of the town, however, is regular and handsome. This space contains 8 or 9 well-built, parallel, and wide streets, where are the best shops of the city. These are crossed at right angles by others that terminate in a handsome square, the Prada de Commercio, one side of which is formed by the Tagus and the others by the arsenal, custom-house, exchange, royal library, and other public buildings, the whole presenting a magnificent aspect from the river. In the center is the statue of King Joseph I.

The arsenal, formerly one of the finest establishments of the kind in Europe, is now, with the dock-yard, on a reduced scale. A handsome aqueduct brings water into the city from the springs near Bellas, a distance of 9 miles. This, as a work of art, is not surpassed in boldness of design and grandeur of effect by any in Europe.

The climate is healthy and genial. It is hot and dry in the summer months when the thermometer often shows 96° Fahr. Heavy rains fall in November and December, and rains are quite frequent from October to April. It is cold in January, but snow is of rare occurrence, and in February spring begins.

Lisbon is abundantly supplied with fruits and with necessaries of all kinds, and the trade and commerce is considerable. It has manufactories of silks, sail-cloth, rope, paper, soap, leather, cotton and linen stuffs, sugar refineries, potteries, candles, and chemicals. It exports wines, fruits, salt and oil. In 1864, 1,242 vessels of 375,217 tons entered at this port, and 1,192 vessels of 376,952 tons cleared. Besides this large number, the coasting trade gave occupation to 2,308 vessels of 147,701 tons. Of the whole number 662 were steamers, Lisbon being in constant steam communication with all the countries of Europe, Madeira, and Brazil.

Portuguese vessels have the monopoly of the coasting and colonial trade, and of importing, for sale in Portugal, the products of India and China free of duty. They have also a reduction of duty of 20 per cent. on all goods imported, and steamers pay only ⅔ the amount of duties paid by sailing vessels. There is a 12 per cent. custom-house due for enrollment and additional tax. Portuguese vessels and vessels to which like privileges are secured by treaty, pay but half the tonnage dues exacted of others.

The little bays along the south bank of the Tagus opposite Lisbon, abound in fish and shell-fish. There is a line of small steamers plying several times a day between the city and Cacilhas, Seixas, and the Barreiro, where is the railway station of a line to Vendas Novas, which has a branch line to Setubal.

Cachopo, or Cachop shoals.

Off both points of the entrance to the Tagus there are dangerous sandy shoals extending in a southwesterly direction, and having between them a deep channel, which is nowhere less than $\frac{9}{10}$ of a mile in breadth between the 5-fathom lines of soundings. They are named the North Cachopo and South Cachopo banks.

From the depth of 4¾ fathoms at the west end of the North Cachopo, fort San Julian bears about NE. ¾ E., distant 3⅛ miles; thence the shoal, with from ½ to 2½ fathoms water on it, extends in the direction of the fort, leaving at its east end a narrow passage into the Tagus, called the north channel.

From the SE. point of entrance to the Tagus the South Cachopo extends to the WSW. and SW. for 2⅓ miles. From the depth of 4¾ fathoms at the west end of the shoal, Bugio fort bears nearly NE. distant 1¾ miles. The larger portion of this shoal has little more than 1 fathom water on it, and around Bugio fort the sand is dry at low water.

Bar.

The bar between the western extremes of the Cachopos has 6 and 7 fathoms over it at low water springs. The channel within it soon deepens to 9 fathoms, increasing to 19 fathoms abreast Bugio fort. Notwithstanding the depth upon the bar, and the distance between the extremes of the Cachopos, the sea in SW. gales rolls over it with great force, frequently forming one tremendous roller that breaks with irresistible violence the whole distance across. At such times the bar is impracticable, and in winter, or when the freshets are strong and accompanied with westerly gales, continues so for several days together.

Lights: Lat. 38° 40′ 18″ N.; long. 9° 20′ 30″ W.

From a tower in fort San Julian, at the north point of entrance to the Tagus, is exhibited, at an elevation of 128 feet above sea-level, a *fixed white* light, visible 12 miles in clear weather. Communication may be had with this tower by the *universal signal code.*

Lat. 38° 39′ N.; long. 9° 18′ 39″ W.

The tower of Lorenzo, in Bugio fort, exhibits, at an elevation of 110 feet, a *revolving white* light, which attains its greatest brilliancy every 1¾ *minutes*, visible 16 miles in clear weather.

Lat. 38° 40′ 46″ N.; long. 9° 13′ W.

From the fort close to Belem castle, a *fixed red* light is exhibited at an elevation of 30 feet, visible 6 miles in clear weather.

Tides.

It is high water at Belem, full and change, at 2h. 30m.; springs rise 12 feet and neaps 9 feet. The time of high water at Lisbon is 2h. 40m., and in the bay of Cascaes 1h.

40m. The great danger in entering the Tagus is occasioned by the tides. Off the city of Lisbon the ebb sometimes runs at the rate of 6 or 7 miles an hour, particularly when the freshets come down after rain, so that anchors frequently come home. The flood is commonly much weaker than the ebb.

When a strong ebb is opposed by a gale from seaward, the sea breaks completely across the bar, so that the breakers cannot be distinguished from those on the Cachopos. In the south channel, in mid-channel, the current sets directly through, but near the edges sets toward the shoals. In the north channel the ebb sets to the NE. extremity of North Cachopo bank, and it is dangerous to leave the river by this channel unless with the flood and a favorable wind, and the flood-current does not set in until about half-tide. The velocity of the current over the bar is 3 miles an hour on the flood and 4 miles on the ebb under ordinary circumstances; therefore, to enter during the ebb, requires a strong breeze and the vessel well under command.

Within the river the wind, unless it is from W. or SW., comes irregularly through the valleys on either side. It is, however, pretty steady when it blows in the direction of the river. It is also to be noted that the tide draws strongly toward the Bugio bank, and divides the water in that vicinity into several counter-currents, so that a vessel approaching too near that bank is liable not to obey the helm.

Pilots.

Pilots are usually to be found some distance from the entrance of the Tagus. Their boats are to be distinguished from others by a blue flag hoisted at the yard-arm of their lateen sails, and the letter P in the foresail. The flag is sometimes at the foremast head. There is generally one of the boats near the north and another near the south shore.

Leading marks.

Santa Martha fort, to the southward of Cascaes, is white and of triangular form to the eastward, with a low battery extending to the northward. Guia light-house, in one with the bastion of this fort, W. by N. ¼ N., leads through the north channel.

Cascaes fort, large and conspicuous, stands to the northeast, between Santa Martha and the town of Cascaes, its outer northern wall extending to the town.

Fort San Julian is an extensive fortification erected on a high, steep point, on the northwest side of the entrance to the Tagus. A ledge of rocks with 3½ fathoms water on it extends a short distance to the southeastward of the fort.

Bugio fort, of circular form, and surmounted by the light-tower, stands upon the highest part of the South Cachopo, about ⅜ of a mile from Medão point, the southeast point of the mouth of the Tagus. The sand around it dries at low water.

The Paps are very difficult to distinguish, particulary on the bearing used for the south channel, from whence they appear over some flat ground which scarcely shows above the land southwest of it. They lie to the eastward of a ridge of hills with a number of windmills, five of which are close together, then two, and just to the eastward of the latter the Paps will be found. When seen to the northward of San Julian, or to the southward of Bugio, they show like two small hummocks, but when in line with either of the turning marks, or with the leading mark of the south channel, they appear as a single hummock with a flat top.

The Mirante or turret of Caxias is a small building formed of two white octagonal turrets with red cupolas, on a hill about 3 miles NE. by E. (nearly) from fort San Julian, and when in one with the Paps, bearing about NE. ½ E., is used as the northern turning mark for the south channel.

Jacob's Ladder is a range of black masonry or stone wall supporting the cliff a little to the southeastward of the turret of Caxias, and is not easily distinguished, but there is a stone wall resembling an aqueduct to the eastward of it and another to the westward; Jacob's Ladder is used as the center leading mark for the south channel when brought in one with the Paps bearing NE., easterly. A large conspicuous cypress tree stands a third of a mile to the eastward of Jacob's Ladder, and when in line with the Paps, about NE., is used as the southern turning mark for the south channel.

The convent of Boaviagem, an extensive and very white edifice, is just east of the cypress tree, and the Paps in one with the left side of the convent bearing NE., easterly, just clears the South Cachopo, in 6 fathoms.

The tower of Belem is an ancient square building 92 feet high, and formed of three distinct parts, with a battery just above water; it is about 5¼ miles above San Julian, and is nearly insulated at high water. It stands on the extremity of the point, from which the coast bank extends along shore to the westward, and appears to be increasing. To guard vessels from this danger the *fixed red* light is shown on the eastern side of Boã Successo fort, 200 yards WNW. ½ W. from the tower of Belem.

The dome of Estrella is an excellent mark, and readily distinguished by its great size, being the largest dome in Lisbon, and towering above all other buildings in the city; it is 440 feet high. When in one with Bugio fort it bears NE. by E. ¾ E.

Dangers. Half a mile W. of San Julian there is a small shoal, with 3½ fathoms water on it, just outside the North narrows. The leading marks already given just clear this shoal in 6 fathoms, leaving it on the port hand in entering.

The ledge extending to the southeastward of fort San Julian is already mentioned. It should be noted that the flood sets right on this shoal, and the ebb sets directly on the North Cachopo. The ledge extends about 90 yards from the south point of the fort.

From San Julian, there is a narrow bank along the north shore of the river, extending as far as abreast Cacilhas point. This bank is widest in the bight, west of Belem castle, off the castle itself, and abreast the faubourg of Alcantara, where it takes the name of Alcantara bank. This portion is cleared by keeping fort San Julian and its outworks open of the parapet of Belem until abreast the anchorage.

On the south shore the only bank to avoid is that of Trafaria, shortly within the entrance. All the foul ground here is cleared by keeping the houses of Torre da Velha open north of the cliffs of Trafaria.

Anchorage. Vessels can anchor anywhere in the port of Lisbon, after passing Belem castle, selecting the most convenient position for the business of the ship. Many of the steamer lines have wharves assigned them, and the steamers lie alongside; other vessels anchor a little off shore, in 7 to 14 fathoms, thick mud, good holding-ground, and out of the strength of the current. An excellent anchorage in 7 to 8 fathoms is off the Packet Stairs, with the tower of San Julian in line with the parapet of Belem castle. On account of the SE. winds, and the liability of anchors dragging, and as the anchors are not allowed to be buoyed elsewhere, some vessels prefer to anchor in the bay of Cacilhas, where they are well protected, mooring E. or SE. of the point in 6 to 8 fathoms. There is a shoal patch, with 4½ fathoms on it, about 6 cables E. by S. from the point, which, in such a case, must be avoided.

Directions.

The position of the Tagus is easily recognized coming from seaward by the gap through which the river flows, the Cintra mountains, and capes Roca and Espichel; coming from the north, by the Burlings and cape Roca; and coming from the south, by the bay of Setubal, cape Espichel, and the mountains inland.

In nearing cape Roca, commonly called the Rock of Lisbon, it should be borne in mind that, with northerly winds, the current has a general southerly trend, varying between SW. and SE., at the rate of ½ to 1 mile an hour. The soundings from the Burlings to the southward are regular; a depth of 40 fathoms will insure an offing of about 10 miles until near cape Roca, when a greater depth will be found at that distance. At night, in clear weather, the light on the cape will be seen, having passed which, the Guia light will soon be observed, and a vessel may, if necessary, keep in the offing in sight of the lights until daylight.

North channel.

The north channel into the Tagus requires a knowledge of the tides, and, in a sailing-vessel, a commanding breeze. Having passed Guia and Cascaes, bring Cacilhas point (the eastern termination of the south shore) in line with the south face of fort San Julian, bearing E. ½ N., or, if wishing to borrow on the North Cachopo, Belem tower on with the SE. extreme of San Julian point: steer on either of these bearings until Guia light-house is in one with the angle or center of the high part of Santa Martha fort WNW. ¾ W.; then keep this latter mark on astern, and it will lead in mid-channel and in not less than 6 fathoms at low water.

When the center of mount Cordova (on the south shore) comes in line with Bugio tower bearing SE. by E. ¾ E., when the vessel will be about 3 cables SW. by W. from San Julian, steer for Bugio until San Thomas fort (which is white and on the shore a long half mile NE. of San Julian) opens to the eastward of the yellow fort of Catelazeite; then haul into the river, but carefully allowing for the tides, remembering that the flood sets with great velocity on to the reef off the fort, and the ebb on the North Cachopo. The narrows are 2 cables wide, with 6 fathoms at low water.

Mount Cordova is 12 miles from San Julian fort, and may not be visible. In this case, having entered the north channel, as soon as the rocks at Catelazeite point are open of the SE. angle of San Julian fort, steer for fort Bugio until the battery at Catelazeite point, San Thomas fort (the next to it) and the outer windmill are in line bearing NE. by N., and then haul more to the eastward into the river. Rana church in one with Quinta Nova is a good mark to check a vessel's position when running through the north channel with Cacilhas point in line with the southern face of fort San Julian, for she will then be in the center of the fair-way and have Guia light-house in one with the bastion of Santa Martha fort.

South channel.

The south channel is the principal passage into the river. In entering it with a fair wind, and rounding the southern extremity of the North Cachopo, keep the Peninha peak (or western part of the mountains of Cintra) open west of Cascaes fort and bearing N. by W. ½ W. until Bugio fort comes in line with the Estrella dome at NE. by E. ¾ E.; then steer on this bearing, which will lead across the bar in the deepest water, and in not less than 6½ fathoms; and when the Paps are in one with the Jacob's Ladder, NE. ⅛ E., the vessel will be inside the bar and the depth of water will have increased to about 10 fathoms. With a fair wind run up on this latter bearing, but if the wind hangs to the northward, borrow as far as the northern turning mark, (Paps in line with the turret of Caxias;) and if it be from SE. borrow toward the southern turning mark, with the Paps in line with the cypress tree, but avoid going too near Bugio, as the tides there are strong and irregular, and the South Cachopo steep to.

Having passed between Bugio and San Julian, keep to the northward so as to clear the sandy flat inside Bugio till Belem castle is in line with the south part of the city of Lisbon, bearing ENE. ¾ E. Pass Belem castle at a distance of 2 or 3 cables, and then proceed to the anchorage, keeping the whole of fort San Julian and its outworks open southward of the parapet of Belem castle, which will clear the shoals of Alcantara. Anchor off the Packet Stairs in 10 to 14 fathoms, or farther up in 12 to 16 fathoms, mud.

Working through the south channel.

A vessel from the NW. standing toward the west tail of the North Cachopo, should keep Peninha peak bearing

N. by W. ½ W. open west of Cascaes fort, and not stand into less than 12 fathoms water, until the south part of the city of Lisbon is in line with Bugio fort, ENE. ¼ E.; then haul to the wind. The turning mark for the north side of the channel is the Paps in line with the Mirante or turret of Caxias, NE. ½ E.; and the turning mark for the south side is the Paps in line with the cypress tree, (which stands ⅓ of a mile to the eastward of Jacob's Ladder,) NE., or the paps, in one with the left side of Boa-Viagem convent bearing NE., which just clears the South Cachopo in 6 fathoms.

The northern turning mark is a safe and prudent one, as a vessel will not approach any part of the North Cachopo nearer than ¼ of a mile; but the southern turning mark carries a vessel within 1½ cables of the South Cachopo, and as the tides here are uncertain the shoal should be approached with caution. It is by no means desirable to have a tree, that may be down at any moment, for a clearing mark, but in this case the mariner, standing for the latter bank, need go but little beyond the line of the central leading mark. In places, both North and South Cachopo are steep-to.

Rana church open westward of Quinta Nova, N. ¾ W., clears the tail of the South Cachopo, and in working in a vessel need not go to eastward of this line until well inside the channel. A mill on a height 1¼ miles northeastward of fort San Julian, open eastward of fort San Thomas, NE. by N., clears the eastern edge of the North Cachopo, and this is a good near fair-way mark for running out through the south channel. The shallow ground around San Julian extends a little distance from the fort, but deepens immediately to 5 and 6 fathoms. San Thomas fort well open east of the small battery of Catelazeite on the intermediate point, clears the south extremity of this shoal.

Having passed forts San Julian and Bugio, stand to either shore into 12 fathoms. A good mark for clearing the shoulder of the sands inside Bugio is Belem castle, in line with the citadel of Lisbon, which stands on the first rise of the land from the south point of the city. Trafaria bank, farther in, extends fully ⅓ of a mile from shore, and is cleared by keeping the houses of Torre Velha open north of Trafaria cliffs. Above this bank the south shore is clear, with deep water as far as Cacilhas point.

Between San Julian and Belem castle the bank which borders the shore may be avoided by keeping Belem castle open of Cacilhas point. At 1 cable S. of the castle there are 5 fathoms of water, but the bank is wider east and west of it.

The clearing-mark for Alcantara bank is already given. The bank is passed when Alcantara, which appears like the angle of a fort with a watch-tower, bears NNW. ¼ W., when the shore may be approached until the tower of San Julian is in one with the parapet of Belem castle, and this is a good mark for anchoring in an inshore berth off the Packet Stairs, in 7 to 8 fathoms water, while ships of heavy draught will be far enough out in 12 or 14 fathoms, good holding-ground of stiff mud, and out of the strength of the tides.

In gloomy weather, if obliged to enter the south channel in a gale, without being able to take a pilot or to distinguish the farther leading-marks, the greatest precaution is necessary. Keep directly south of Cascaes until Bugio bears NE. by E. ¾ E.; take this bearing as a course until San Julian bears NNE.; from thence steer NE. to pass midway between Bugio and San Julian (or, if the turret of Caxias be visible, head for it) until off the Paço de Arcos, when follow the course of the river at a convenient distance from the north shore until the anchorage is reached.

At night. If coming from the northward, keep Guia light on a NNW., or Cascaes light on a N. bearing, until Bugio light bears ENE. Then steer for Bugio until San Julian light bears NNE., when a NE. course will lead between the two lights. When Belem light is seen, bring it to bear E. by N., and the vessel will be nearly in mid-channel, and run up the river.

If coming from the southward, bring San Julian light to bear NNE., and run on that bearing until Bugio light bears ENE., and then proceed as above directed. San Julian light N. just clears the South Cachopo in 4 fathoms, at 1 cable from the depth of 2½ fathoms.

When cape Roca light is shut in with Guia, a vessel will be nearing the shoals, and within the influence of the river tides, and therefore a constant and cautious reference to the bearings will be necessary. Should the ebb tide be running, be careful not to be set too near Bugio, and if in any doubt, steer more to the northward.

Caution. In fine weather large numbers of fishing-boats anchor outside the bar, and show position lights when they see a vessel approaching, which must not be mistaken for the leading-lights. It is well to keep pretty well toward the north side of the channel, for in case of accident or calm the anchorage is better and the strength of the tidal currents is less. Entering with the ebb, keep all sail possible, so as to have the vessel under good control. It should be kept in mind that with wind from N. to W. and from S. to E., the wind inside will come in squalls with calms between, which is not the case with wind from W. or SW. With the latter, however, if there is a strong ebb, there is considerable broken water on the bar.

Cape Espichel. From Bugio fort the coast forms a shallow bay with a sandy shore to within 2 miles of cape Espichel, (15 miles S. by E. ½ E.,) when it becomes rocky, steep, and high to the cape. About 6 miles northward of the cape is the lake of Albufeira, the mouth of which is closed at times, and north of the lake are the heights of the same name, parallel to the coast, reaching an altitude of 344 feet. Nearer Bugio is a village, some fishermen's huts, and a few hermitages surrounded by small groves of pines. On the high lands are great numbers of windmills. Cape Espichel is a steep, bold headland, above 500 feet high, presenting a bluff to the SW. about a mile in extent. Its summit is level, of a whitish color on the north side, and reddish on the south; and on it is a convent and a light-house. From the cape the coast turns suddenly to ENE. for 14 miles to the entrance of the port of Setubal or St. Ubes, then southward for 27 miles to the small river Andrés, and then S W. for 8 miles to cape Sines, forming a deep bight between the latter and cape Espichel.

Light: Lat. 38° 24′ 09″ N.; long. 9° 13′ W. South of the convent, on cape Espichel, there is a square tower 100 feet high, which displays, at an elevation of 625 feet above the level of the sea, a *fixed white* light, visible 12 miles in clear weather.

Setubal bay. The large bight above described is the bay of Setubal, and the land on the north side of it is remarkable, not only for the sudden turn in the coast from the cape, but also for the mountains in its neighborhood, the highest of which, the peak of Formozinho, is 1,635 feet above sea-level, and visible 46 miles off. This peak is about 11 miles eastward of cape Espichel and 1½ miles from the peak of Arrabida. The mountain is 4½ miles long E. and W., so that seen from northward or southward it seems of considerable extent, but from the westward it appears isolated.

At 3½ miles to the NE. of the latter mountain is the Serra de Luiz, or mount Cordova, the leading-mark for the north channel into the Tagus. It is 1,190 feet high, round and resembling a hay-stack, and 2¾ miles NE. ¼ N. from it is the castle and town of Palmella, which, being isolated and built on an elevation of 875 feet, may be seen a considerable distance. The mountains of Arrabida, San Luiz, and Palmella form a triple range clearly distinguishable, and, when seen at a great distance from the south, form a good landmark for cape Espichel; seen from the SW., however, the peaks are confused and are less easily made out.

In case of necessity, and with northerly winds, there are two anchorages under the land between cape Espichel and the shallow ground fronting the entrance to Setubal.

Balieira bay. The first is in Balieira bay, 3 miles from the cape, in 15 to 30 fathoms water, sand. In summer, with winds from NE. to NW., this is quite good, but it is dangerous at other times.

Cezimbra bay. The second and better anchorage is in Cezimbra bay, off the town of the same name, in 7 or 8 fathoms near the shore, for in 10 to 12 fathoms there is a bed of rocky ground 100 to 150 yards wide, which extends a considerable distance along shore. The inlet itself is W. of cape Ares, which is high, salient, with a small detached rock close to it and 4 miles from Balieira.

To avoid the rocky ground, close the shore until the small rock off cape Ares is shut in. When at the anchorage inside in 7 or 8 fathoms this rock will be shut in with the cape, but it is better to anchor outside the foul ground to have room to weigh and work off, should the wind change to the southward. From cape Ares the land continues high and steep with rocky cliffs for about 8 miles to the town of Setubal, and about midway is fort Arrabida, with a convent and chapel on the high land above it.

Setubal. Setubal (St. Ubes) is the third port of Portugal. The town stands on the north side of the estuary of the river Sado, which rises in the south of the province of Alemtejo, and after a course of 110 miles, of which 35 are navigable, it forms a wide estuary, and falls into the sea. In this basin the Mareteca river empties, and the harbor is inclosed from the sea by a tongue of sandy land, which leaves the southern shore and extends in a northwesterly direction. Between the end of this tongue and the northern shore is the entrance, about ¾ of a mile broad, with 9 to 20 fathoms water. Within this and along by the north shore there are 15 to 7 fathoms, and in front of the town good anchorage in 5 to 8 fathoms. Between the tongue of sand and the eastern shore is an extensive sand-bank, which uncovers at about half ebb, with channels on either side of it, in which there is good anchorage in 8 to 11 fathoms, sand.

Setubal is a walled city, and the environs are very picturesque. The trade of the port is considerable. Its principal exports are corn, wine, oil, and salt, for which latter article it is celebrated, and the facilities for shipping it are so great that ships of 1,000 tons can be loaded in 24 hours. Ships coming for a cargo usually enter in ballast, as the imports amount to nothing. In 1864, 385 vessels, amounting to 49,028 tons, entered in ballast and loaded here.

The port dues and pilotage are 30 *reis* per ton up to 150 tons, and 10 *reis* for every additional ton. The maximum charge is 7,500 *reis;* the custom-house charges amount to 1,920 *reis;* the police, 540 *reis*, and each vessel loading is obliged to take 30 moyos (48,000 lbs.) of salt at the highest rate from the salt-works of the Setubal hospital. This is the only restriction which has survived the old régime.

There is a branch road connecting Setubal with the Lisbon and Evora railway. Provisions, repairs, and workmen may be obtained.

Bar. At about ¾ of a mile WSW. from fort Arrabida, a shallow, sandy flat leaves the shore, and, sweeping to SSE. and E. for 6 miles, covers the entrance to the harbor, and joins the tongue of land about 4 miles from its northern extremity. A channel into the harbor, carrying from 3 to 20 fathoms water, is formed through the sands, having at its entrance a bar with about 12 feet water over it at low tide, which lies about 1½ miles SSE. from fort Arrabida, and 2½ miles SW. by S. from fort Outão, and which is marked with two buoys. The northern buoy is *white*, and has the letter N painted on it, and lies about 2½ miles SW. ⅝ S. from Outão light; the southern buoy is *red*, and marked with the letter S. At high water springs there are 25 feet over the bar, and at neaps, about 21 feet. The buoys should not be too much depended upon.

Light: Lat. 38° 30′ N.; long. 8° 57′ W.

On point Outão, near the fort of the same name, on the northwest side of entrance to the harbor is a circular tower 36 feet high, which exhibits, at an elevation of 490 feet above the level of the sea, a *fixed white* light, visible 15 miles.

Tides.

The establishment at Setubal is 2h. 30m. The rise at springs is 10 to 12 feet, and at neaps 6 to 8 feet. Westerly winds increase the rise of tide.

Directions.

Vessels bound into Setubal should bring the light-house to bear NE. by N. and steer for it; when fort Arrabida bears N. by W. ½ W., distant 1½ miles, the vessel is near the bar; steer for the fair-way channel between the *red* and *white* buoys with the SE. part of fort San Philip (at the head of the bay) just open southward of Outão; with these marks pass on, keeping close to Outão fort, keeping along by the north shore, and having passed Albarquel fort an anchorage may be selected off the town in 5 to 9 fathoms at low water. The best time for passing the bar is, of course, with a rising tide.

If obliged to enter at night keep the light NE. by N. until the buoys are recognized; pass between them and run directly for the light until near; pass 32 to 44 yards from the tower, and then head for the lights of the shipping at the anchorage.

Pilots.

The pilot-station is in the little cove adjoining Arrabida point, and when they cannot get outside the bar they guide ships entering the harbor, by signals from the pilot-boat, which is anchored, at such times, in the fair-way just within the bar. Their boats carry a *red* flag at the main, and have a P painted in the mainsail. If the pilot-boat anchored within the bar should lower the flag at the main and get under way for Setubal, it is a signal that the bar is impracticable and the vessel must keep at a distance until a more favorable time.

Cape Sines.

From Setubal to the southward the shore is generally low, with a sandy beach and some downs. Pesqueira point projects, and to the southward of it are two small hills with houses on them, which serve to mark this part of the coast; the southern hill is called San Tiago de Cacem, on which is a castle and town, and which can be seen for a considerable distance. Two small rivers, the Melides and the Andrés, here fall into the sea, but are fit only for small craft.

Cape Sines, about 31 miles southward of Outão light, is steep-to, with two small islets, called Percebeiras, close off it. The castle and town of Sines are built on the shore just to the south of the cape; its exports are cork-wood and fruit. The population, about 2,000, are chiefly engaged in fishing.

A sweep of the beach here forms a bay, which affords shelter from northerly winds, but is open to the SW. Vessels generally anchor off the town in 9 to 15 fathoms water, sand, about ½ mile off shore, with the Percebeiras in one with the extremity of the cape. Sines is the birthplace of Vasco de Gama.

Coast. The coast from Cape Sines is generally low and sandy, as far as Aljezur, 35 miles farther on; thence to cape St. Vincent it becomes higher, with steep rocky cliffs. East of Sines bay is the little rivulet of Junqueiro, and 5 miles farther south (9 miles from cape Sines) is Passegueiro islet off the fort of San João de Sines, and separated from the coast by a narrow channel, in which the coasters occasionally anchor in fine weather. A little north of the fort is a small inlet, where the coasting-vessels coal, and about 5 miles south of Passegueiro islet are some small reddish cliffs that show plainly above the surrounding low shore.

The bar of the Odemira river is about 3 miles farther south. This river rises in the Serra de Monchique, and is navigable for small craft for 12 miles to the town of Odemira of about 2,300 inhabitants. There is a depth of only 1½ fathoms at high water on the bar, which is of shifting sand, and a pilot is requisite in entering. The town of Milfontes, 1 mile within the bar, has a population of 1,800, and many coasters come here to load with coal.

The coast continues sandy for nearly 3 miles to the southward of the bar of Odemira, when there is another patch of red cliffs like those to the northward and which are excellent marks for this part of the coast.

Cape Sardaõ, a high projecting cliff, is about 6½ miles southward of the red cliffs, and the same distance farther on is the mouth of the river Odeseixe, which separates the provinces of Alemtejo and Algarve. North of cape Sardaõ is a small bay with the town of Sardaõ at its head. Two small islets are in this bay, which is completely open to the west.

At 6 miles south from the Odeseixe is the mouth of the small Pomares river leading to the town of Aljezur, on a sand-hill, crowned by the remains of an old castle; and 3½ miles farther on are the ruins of Arripana battery, on the point of the same name, with a sandy beach, and about a cable off it, there is a remarkable rock, named the Agulha, (Needle.) This rocky islet is barren, surrounded by bowlders, and at a distance looks like a vessel under sail.

At 4 miles beyond this rock is the point with the ruins of Carrapateira fort. Between the two the coast forms a bay where small craft anchor off the beach in 7 to 11 fathoms, during northerly or off-shore winds. Carrapateira point is high and rocky, and has some resemblance to cape St. Vincent, for which it may sometimes be mistaken by vessels coming from the northward along the coast. South of the point is a little bay and stream, off which is a rock, which is covered at high water.

At 11 miles SW. by S. from Carrapateira point is cape St. Vincent. From the red cliffs to the cape the coast is composed of high, steep, rocky cliffs, reddish in color, with a few rocks at their foot, the farthest off shore being the Leichão, about 1 mile from the cape. Except the beach at Arrifana point and Roiçada beach, 1 mile northward from the cape, this part of the coast is inaccessible.

Cape St. Vincent.

Cape St. Vincent or San Vincente, the SW. extremity of the Iberian peninsula and of Europe, is a small peninsula about 200 feet high, bluff and level, and having a convent, on which is a light-house, and other buildings on its summit. At about 50 yards from the pitch of the cape there is a high isolated rock, with 15 fathoms water, sand and shells, between them. At 1 cable from the rock there are 20 fathoms. From the cape, the coast, composed of high, steep cliffs, trends SE. for 4 miles to Sagres point, which is about 200 feet high, with a small village on it. This point is steep, rocky, and inaccessible on all sides except at the isthmus connecting it with the main-land, which is 137 yards wide.

Light: Lat. 37° 03′ N.; long. 9° W.

The light-house on cape St. Vincent, a circular tower 52 feet high, exhibits, at an elevation of 220 feet above the level of the sea, a *revolving white* light, attaining its greatest brilliancy every 2 *minutes*, and visible 20 miles in clear weather.

Belixe bay.

Between cape St. Vincent and Sagres point there is the bay of Belixe, where there are two anchorages that are occasionally used. One of these is under cape St. Vincent, near the fort of Belixe, and the other near the isthmus of point Sagres. In making this latter there is a 4-fathom patch to be avoided, lying about ½ a mile NW. by W. from the NW. extreme of Sagres point. These anchorages are only used by coasters and in summer.

Cape St. Vincent is easily recognized from north, south, or seaward by its isolation and elevation, by its projection to SW., and by the convent light-tower, and other buildings on its summit. From seaward its position may be determined by the Serra de Monchique, with its two peaks about 4 miles apart, and lying WSW. and ENE. from one another. The western peak, Foya, 2,963 feet high, is 25 miles NE. ½ E., nearly, from cape St. Vincent, and about 12 miles E. of Aljezur. The other peak, Picota, is 2,835 feet high. The Serra de Monchique adjoins Serra de Mesquita, and the latter joins the Serra Morena; they run E. and W. between the Guadiana and cape St. Vincent. Monte Figo, formed by a spur of the first named, is about 11 miles NNE. from cape St. Mary. It is 1,329 feet high and is visible 50 miles, though it cannot be distinguished in approaching from the westward until after passing cape St. Vincent.

Currents. In light winds sailing-vessels should preserve a good offing when in the vicinity of cape St. Vincent, as the currents generally set strong alongshore, and have a tendency toward the cape. Ripples are occasionally seen off the cape like the ripples on a bank, but they are probably caused by the meeting of the general and the tidal currents.

Soundings. The soundings along the coast of Portugal have about the same regularity as those off the Spanish coast. The 100-fathom line passes 12 miles from cape St. Vincent and at a greater distance from cape Carvoeiro. At 5 miles there are 26 to 37 fathoms, generally sandy bottom, rocky bottom being often found inside of 18 fathoms.

CHAPTER VII.

FROM CAPE ST. VINCENT TO THE GUADIANA.

Variation in 1869, 20° 10′ W.; *diminishing about* 4′ *annually.*

Sagres bay.

On the east side of Sagres point is the bay of the same name, where vessels will find shelter from northerly winds by anchoring in 11 fathoms water, about ½ a mile from the shore. The village of Sagres, near the neck of the peninsula, has a population of about 300, and is defended by two little forts.

Balieira point, rocky, and with a fort on its summit, is the eastern point of Sagres bay, and NE. of this point is Balieira or Morinhal bay, with three rocky islets, where anchorage for small vessels may be found in 5 or 6 fathoms. Vessels should leave these bays directly the wind changes.

Coast.

From Balieira point the coast, generally of steep cliffs, trends ENE., 13 miles, to Piedade point. In this extent are several small bights with beaches, off which coasters sometimes anchor. At 3 miles NE. of Balieira is Benisoitao river, which flows between two hills and over a little beach, and has a fort at its mouth; at 2½ miles farther on is Figueira fort, on the east bank of another brook, and then fort Almadena, which protects the rivulet and beach of the same name. East of Almadena is the beach of Nossa Senhora da Luz, at the western side of which is a battery, village, and church of the same name.

Piedade point, at the entrance of Lagos bay, is the termination of some whitish high land, called the Alto de Barril, which extends 2 miles in an east and west direction, and is about 475 feet high. Point Piedade is steep and rocky, with a battery on it. Several large rocks lie along its eastern face, and a reef extends from it about 1 cable to the southward. Foya peak, the western one of the Serra de Monchique, bears N. by E. ¼ E. from the point, distant 13 miles nearly.

The principal features of this coast, from a distance, are the Serra de Monchique, already described, mount Figo, and Monte Gordo. Mount Figo, 1,329 feet high, (the French sailing directions of 1869 give the height of this peak as 2,000 feet,) is visible 50 miles. It rises about 11 miles to the NNE. of cape St. Mary, and is more distinctly seen from the eastward or westward, as it then appears separated from the mountains to the northward of it, but from the southward it is blended with them. In approaching from the westward this mountain is not visible until 10 miles eastward of cape St. Vincent, and it should not be mistaken for a smaller mountain to the NW. of it. Monte Gordo, in Spain, is 5 miles E. of the Gaudiana, and, being higher than mount Figo, is a good mark for the entrance of that river.

Lagos bay.

Lagos bay, between Piedade point and point Tres Irmaos, (Three Brothers,) is 7 miles across and 1 mile deep. The north shore of the bay is a sandy beach, the land rising inland and presenting a pleasing appearance, with numerous towns, villages, and villas. The town of Mexilhueira, situated inland and north of the bay, between the Arão and Verde rivers, is at a considerable elevation, and can be seen from 12 or 15 miles at sea. Tres Irmaos point, the eastern extremity of Lagos bay, is of moderate height, with 3 small rocks off it, from which it takes its name.

Anchorage.

Lagos bay affords good anchorage, with northerly winds. Large vessels anchor a mile or more E. of Piedade point in 12 or 15 fathoms water, sand; and smaller vessels nearer the town in 8 to 10 fathoms, while coasters lie close in and find shelter even from SW. winds. From the first named anchorage it is easy to weigh with any wind, and it is necessary to do so with winds from seaward.

Tides.

The establishment of the port of Lagos is 2h. 7m. Springs rise 13 feet and neaps 7 feet. The bar of the river Lagos is just covered at low water.

Lagos.

Lagos, the chief town on the SW. coast of Algarve, is located about 1½ miles to the northward of Piedade point, on the west side of the entrance to the river Lagos. It is surrounded by ancient walls terminating on the south in two batteries, named Pinhao and Bandeira, and contains about 9,000 inhabitants, who carry on an extensive fishery, and a coasting-trade that employs about 100 vessels. Sardines, tunny, and many other fish of excellent quality are caught and a good proportion of them exported. All ordinary butchers' meat, with game, vegetables, figs, almonds oil, and fruit are abundant. The river Lagos is a small, stream which passes near the town, and vessels of 7 or 8 feet draught may enter at high water with the aid of a pilot. Water may be obtained from the river at a suitable time of tide.

The town of Alvor, with about 1,500 inhabitants, is about 1½ miles from the mouth of the river Verde, which is navigable for small vessels as far as the town, but the bottom, at its entrance, which is 3¼ miles eastward of Piedade point, is foul and rocky.

Silves river. The Silves river, which rises in the Serras de Cavallos and Messines, takes a southwesterly course, leaving the town of Silves on its right; then flows W. to its junction with the Odelouca; SW. again, and S., after joining the Boina, emptying into the sea about 3½ miles NW. of Carvoeiro point, between the forts of Santa Catharina and San João. This river is much frequented by coasters, but can only be entered at ¾ flood, with the aid of a pilot. The bar has only about 7 feet water on it at low and 16 feet at high tide, springs, but within the water is deeper, and for nearly 3 miles up there are 11 to 3 fathoms; thence the river is navigable as far as the town of Silves, about 7 miles from the entrance. In winter the bar is rarely passable for vessels, as the breakers are dangerous, and there is a swell a long way outside them. The bar is of shifting sand, it is difficult to give any leading-marks for crossing it, and a pilot is always necessary.

Pilots. There is a company of pilots for the bar of Portimao or Silves, under the direction of the captain of the port. It is composed of 8 pilots living at Ferragudo, and they have 2 boats. One pilot is always on watch at fort Santa Catharina, which may be distinguished by the mast on its eastern wall, whence signals are made when the swell on the bar prevents the pilots from going out.

Tides. The establishment on this bar is 2h. The rise is 11 feet at high springs and 7 feet at neaps.

Signals. *Red flag.* All vessels in sight may approach the bar.

Red flag with blue pennant above. Vessels drawing 11 feet may approach the bar.

Blue pennant. Vessels drawing 13½ feet may approach the bar.

Red flag accompanied with one or more reports of a cannon. Vessels wishing to enter must approach the bar at once.

Vessels nearing the bar, if no signals are made, or if guns are fired with no signal hoisted, should keep at a distance. If the *red* flag is hoisted and a gun is fired they should take a convenient position and wait to see if they may enter later. The *red* flag hoisted and lowered several times has the same signification.

Reports of a cannon without the *red* flag being hoisted signifies that bad weather is imminent, and that vessels anchored or under sail outside should put to sea.

From the same fort signals are made to the town, giving the class and nationality of vessels outside, and giving information of any danger to them, that aid may be furnished.

The pilotage costs 2,000 *reis* for the pilot-boat, besides 30 *reis* per measured ton. Port dues amount to 5,812 *reis* plus 40 *reis* per measured ton, which are applied to the building of a quay.

Villa Nova de Portimao.

Three cables within fort San João is the village of Ferragudo, off which there is a little anchorage with rocky bottom, and about 1½ miles within the mouth of the river and on the west bank is the town of Portimao. The western bank is higher than the eastern, which is low and marshy, and off which are several mud flats which dry at low water. The anchorage off Portimao is in 13½ to 15½ feet water at low tide. The town, containing about 4,000 inhabitants, is the most important on this part of the coast. A few trading-vessels are built here; the fisheries and coasting-trade occupy the inhabitants, and a ferry connects the town with a village on the eastern shore. Most vessels that enter come in ballast and load with corkwood, (the principal export,) figs, almonds, salt, sumac, carob-beans, &c. Provisions and necessaries are easily procured; water is brought 4 miles.

Vessels of 40 to 50 tons ascend the river as far as Silves, which numbers about 2,000 inhabitants, and is connected with the opposite shore by a bridge.

Coast.

Nearly 4 miles SE. by E. of the bar of Silves or Portimao is Carvoeiro point, rocky, of moderate height, with a fort on it. Thence the coast trends eastward for 3 miles to Santa Rocha, a bluff point with a battery on it. West of Carvoeiro there are always large numbers of fishing-boats that must be looked out for in going to Portimao; they usually show a light at night. East and west of Santa Rocha there is anchorage for coasters; thence a low beach follows to the mouth of the river Algoz, which flows into a bay about 5 miles from Carvoeiro point, and the same distance westward of Balieira point. The town of Pera is picturesquely situated on the east bank of the Algoz, 1¼ miles from its mouth, which is defended by Pera fort.

Between Balieira point and Albufeira point, about ½ a mile ENE., is a little bay fit for small craft, and at the head of it, on a height, is the walled town of the latter name, with a population of about 3,000, chiefly fishermen. There are the remains of a battery on each of these points. From Albufeira point the coast trends ENE., with a bend northward, for 5 miles to fort Vallonga on a projecting rocky point, and about 1 mile beyond it is the mouth of the Quarteira river, defended by a tower on the coast about a mile SE. of the entrance. Two small rocks, named Olhos d'Agua, lie in the bay between Albufeirò point and fort Vallonga, and about SSW. of the tower of Medronheira. A little tin-mine is worked near Vallonga.

The town of Quarteira is on a height a little in the interior, on the right bank of the river. At about 2 miles S E. of the tower of Quarteira is the village and fort of Loulé, and from the tower a sand beach extends in a southeasterly direction, 10 miles to the SE. extremity of Barreta island. This beach is safe all along, and there is a depth of 11 to 15 fathoms at a distance of 2 miles. At 3 miles beyond Barreta island is cape St. Mary, where there is a light.

Cape St. Mary. Cape St. Mary is the south extreme of several low, sandy islands that border the coast for a long distance to the N W. and NE. of it. The island farthest south, and on which is the cape, is the largest and highest of all. It has the form of an oblique angled spherical triangle, concave to the north, is 4 miles from E. to W., and 1 mile wide. Between its north shore and the other islands and banks is the channel of Vaza Barriz, and near the eastern extremity, where the new bar (Barra Nova) commences, are the ruins of a battery. The cape is very low and only distinguishable by the light-house, but the position of it may be determined by mount Figo, (page 185,) about 10½ miles NNE. of it. From the south this peak is blended with the high land in rear but it appears isolated from E. or W. The slopes of the mountains along this part of the coast reach the shores, and are cultivated to the water's edge. The island just described is named Caes; NE. of it is San Lourenzo island, with the remains of a fort on it, and inside San Lourenzo are sand-banks and islands, some of the former being under water, which fill the space between Caes island and the town of Faro, leaving only several intricate channels.

Light: Lat. 36° 56′ 10″ N.; long. 7° 55′ W. On the southern extremity of Caes island there is a circular tower, from which is displayed, at an elevation of 109 feet above sea level, a *fixed white* light, visible 15 miles in clear weather; the tower is white.

Caution. Vessels in the vicinity of the cape should not approach the coast at night or in thick weather, as at 1½ miles southward of the light-house there are only 3½ fathoms water, and at 2 miles 8 fathoms, when the depth rapidly increases, so that at 5 miles there are about 90 fathoms, and a little farther out no bottom at 150 fathoms. The bottom is generally sandy, with small shells. Off all the eastern half of the island the water is shoal for at least 2 miles, but off the western half the depth is somewhat greater.*

Faro. Faro, one of the chief towns on the south coast of Portugal, and the capital of the province of Algarve, stands at the entrance of the little river Valfermoso, about 4 miles N NW. of the light-house of cape St. Mary, on moderately high ground. It is visible from every direction, and is easily recognized by its two white steeples and by the chapel of San Antonio, which is white, and is on a hill east of the town. It can be seen at some distance abreast. The population of Faro may amount to 10,000, chiefly fishermen and mariners. The exports are salt, dried figs, raisins, and cork-wood. A few vessels are built here, and the rope and cordage manufactured are celebrated.

The approach to Faro is by either of three channels, one west of cape St. Mary and two east of it. There is a bar at each entrance, with 9 to 12 feet at high water, but, as the depths frequently alter, the aid of a pilot is necessary. The channel by which vessels generally enter is abreast the town of Olhão, northeastward of the light-house.

The Barra Nova, between the eastern point of Caes island and San Lourenzo, has the most water on the bar, there being a depth of 14½ feet at high springs. The larger vessels bound for Faro or Olhão, should use this entrance as well as those seeking shelter in the Vaza Barriz during winds from seaward.

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*From 1874 until further notice a tunny fishery will be established during the months of April, May, and June, WSW. ¾ W. from cape Saint Mary, to clear which vessels passing should keep 5 miles from the light-house on the cape. Small vessels can pass between this fishing-station and the shore, which is distant about 2,000 yards.

The Barrina, NW. of Caes island, is shallow, and only used by fishing-boats.

The Barra Grande, or Barra d'Armona, is between the N E. extreme of San Lourenzo and the SW. extreme of Armona, the next island to northeastward, and carries 13¾ feet water at high springs; the water then deepens to 18¼ feet, and shoals again over the banks to 12 and 10 feet. At low tide these channels are almost dry. Vessels can anchor outside with everything ready to take advantage of the tide in entering.

Pilots. The signal for a pilot is the national flag hoisted at the fore; if the sea is bad the pilot remains inside the bar and signals with a flag on a small staff. The pilots usually come from Olhão.

Olhão. This town is 4½ miles NE. of the light-house on the seashore, near the mouth of a stream of the same name. This stream may be entered by vessels of 150 tons. The town has a population of 7,000, and is of some commercial importance; its port is safer than that of Faro, and the bar more easily crossed.

Coast. From cape St. Mary the coast trends 29 miles NE. by E. to the entrance of the Guadiana, and is low and sandy. For nearly 23 miles from the cape the coast is bordered by a series of long, low sandy islands with salt ponds, separated by narrow channels navigable for boats, and backed by high land. The sand seems to extend a long way to seaward, from the whitish color of the water, and all along is a famous fishing ground. Vessels may anchor anywhere along this portion of the coast in NE. to NW. winds.

Between Armona island and the Areal de Armazão, just NE. of it, a small channel leads to the town of Fuzeta, easily recognized from seaward by the church in the midst of the houses. The town contains about 1,850 inhabitants, fishermen, and is on the bank of a small stream rising near mount Figo, that only fishing-boats can enter.

Tavira. The Areal de Armazão is the longest of the islands fronting the coast, and on it there are several sand hills, and inside the northeastern part of this island, on the mainland, is the town of Tavira, on both banks of the Tavira river, and 17 miles from cape St. Mary. This Tavira or Gilão river is so shallow that only small coasters can make use of it, and the constantly shifting sands of the bar render a pilot absolutely necessary. The entrance is defended by fort San Antonio. The town of Tavira, at the head of navigation for coasters, is built on low land and divided into the old and new towns, connected by a bridge of 7 arches. The population is about 9,000, and in the town is the residence of the military governor of Algarve. The surrounding lands are very picturesque, being highly cultivated and covered with villas. A brisk coasting and fishing trade is carried on. The establishment at Tavira is 1h. 45m., and the tide rises about 10 feet. There is anchorage with off-shore winds in 4 to 5 fathoms water, outside the bar. Pilots may be procured by the usual signals, and if prevented from coming outside, they signal from within the bar.

Coast. From Tavira, 12 miles NE. by E., to the Guadiana the coast is low and sandy. For 6 miles, or as far as Cacela, it is bordered by the islands and sand-banks that are partly under water, with navigable channels between. The church of Conceicão is 2½ miles from Tavira. There is an anchorage off the battery that is east of the Cacela church, and vessels may obtain water from the Cacela brook. A little more than 4 miles from Cacela, and about 2 miles west of point San Antonio, is the town and castle of Monte Gordo, on a sandy hill of the same name. In fine weather and with off-shore winds vessels may anchor off Monte Gordo, and the fisheries are quite extensive there. The beach here is clean and safe, but near San Antonio point commence the banks and shoals that obstruct the mouth of the Guadiana, so that vessels must give this point a berth of about 2 miles.

Guadiana river. The Guadiana river rises in the province of Albacete, in New Castile, and after a tortuous course through Spain forms its boundary for some distance and then enters Portugal, through which it flows for nearly 100 miles more; then again forming the boundary of those kingdoms from San Lucar de Guadiana for about 21 miles to the sea. It has a total length of more than 400 miles, of which only 25 miles are navigable for vessels of moderate size, and 40 miles, to the town of Mertola, for flat-boats. This latter point is at the head of tide-water. The river empties into the sea a little south of the towns of Villa Real and Ayamonte. Abreast the former the river is 857 yards wide, and the depth is more than 4 fathoms, and abreast the latter the width is 425 yards, and the depth 3¼ fathoms. Vessels of 200 to 300 tons ascend the river as far as Laja, where there is a mole, where they load with manganese.

Spanish bank. The Spanish shore is bordered by numerous banks and flats, commencing at Canela island. At low water many of these flats uncover, leaving an intricate labyrinth of channels between them. The largest of these is the Cabezo do Sal, lying N. and S. at the edge of the main channel.

Canelas point, low and projecting, the NW. extreme of the island of the same name, is 4 cables NE. of Villa Real, and then comes the west coast of Salon island, steep, and 4 cables long N. and S.

Ayamonte. North of Salon island, and on the side of a hill, is the town of Ayamonte, an old walled city of about 6,000 inhabitants, nearly all fishermen. Its port is a little basin, named Ribera, which is nearly dry at low water, and which communicates with the basin of Pinillo, between the islands of Canelas and Salon. The town extends about half a mile N. and S., and there is a battery NE. and another SW. of it. North of the town rises mount Cerro de las Animas, and west of it, on the river's bank, there is a ruined fort on a bluff. The anchorage of Ayamonte is ½ a cable SW. of this fort, in 3½ fathoms water, mud.

Portuguese bank. The Portuguese bank is safer than the Spanish. The low, sandy point of San Antonio projects slightly to SE., and forms the western limit of the entrance to the Guadiana. The Portuguese government are about to build a lighthouse here, whose tower will be a good mark for the position of the river.

Villa Real. Villa Real, belonging to Portugal, is a short distance north of fort Barranco, on the west bank, with a population of 1,700, chiefly fishermen. North of the town is a ruined fort of reddish color, and yet farther north, opposite Ayamonte, is the battery of Carrasquera. The anchorage is off the town, in 3 fathoms water, and here vessels entering the Guadiana must stop to pay their port-dues. Many vessels enter in ballast to load with copper-ore.

Castro Marin. The Portuguese town of Castro Marin, with 3,500 inhabitants, is on a brook of the same name, half a mile inland,

and nearly opposite Ayamonte. The inhabitants are chiefly fishermen and sailors. The town is surrounded by marshes and small streams, and may be reached by a causeway or by the channel. About midway between the towns the Castro Marin creek takes a NW. direction, and has 8 to 10 feet water in it at low-water springs.

Pomeron.

Pomeron or Pomerâo is a little port that has been recently made near the mouth of the Chanza river, and about 40 miles from the entrance to the Guadiana. The perpendicular banks have been cut away until enough space is cleared for dwellings, offices and store-houses for the ore from the San Domingo mines. Vessels load by means of a chute, it taking 1 or 2 days to load a vessel of 200 to 300 tons. A tug tows sailing-vessels to and from the entrance of the river if desired. About ⅓ of a mile below Pomeron a vessel can be grounded on a sandy beach, and at low water her bottom cleaned or repaired. Meat is cheap but poor, and vegetables are scarce at Pomeron, but at Villa Real almost all supplies may be obtained.

Bar.

Off the mouth of the Guadiana are several islets surrounded by shifting sand-banks, so that the bar is very variable. The shoals extend a considerable distance to seaward from both points, and the bar cannot be crossed without a pilot; once across, there is sufficient water for a vessel drawing 12 feet to ascend as far as Pomeron at any time of tide without touching any of the shoals, but vessels must stop at Villa Real to pay the port dues, &c., before going on.

Lights: Lat. 37° 13′ N.; long. 7° 24′ 19″ W.

On Canelas island, near Canelas point, at the east side of the entrance to the Guadiana, two *fixed red* lights are exhibited, to aid in crossing the bar of Ayamonte. The northern one of the two is at an elevation of 22½ feet and the southern one at 21 feet above the mean level of the sea, and they are visible 6 miles in clear weather. These lights are 3 miles from the bar, and their positions are changed as the bar alters. The lanterns are on well-supported iron columns.

Tides.

The establishment on the bar of the Guadiana is 3h., and the rise at springs is 12 feet. The velocity of the tidal current is sometimes 3½ miles an hour, but the ebb increases in strength during the freshets, which are frequent and quite heavy in winter. In such circumstances, which may be recognized outside by the reddish color of the water, vessels should not attempt to enter the river.

Pilots. Pilots go outside to vessels when they are wanted. They fly the national flag with a P in the center. When the surf on the bar prevents their going out they stay inside the breakers and signal the course with a *red* flag. There is an effort to keep the channel buoyed, but no vessel of any considerable draught should attempt to enter without a pilot; nor should any approach the bar with a swell from seaward, for the breakers are then very dangerous, and if it is absolutely necessary to enter, hatches should be battened down and all precautions taken. A good mark in nearing the entrance is the tall tower on Canelas island, 4 cables from the western extremity, which can be seen a good distance at sea. In approaching the bar, keep the town bearing about N. by W. until the pilot comes on board, and do not go within 2½ or 3 miles of the points unless familiar with the shoals.

CHAPTER VIII.

GULF OF HUELVA, FROM THE GUADIANA TO THE GUADALQUIVIR.

Variation 19° 15′ *westerly in* 1871; *diminishing about* 4′ *annually.*

Gulf of Huelva.

The gulf of Huelva is formed by that portion of the coast lying between cape St. Mary and point Chipiona. It is 70 miles across and 20 miles deep to the northward. The soundings are tolerably regular, but the water is not very deep; thus, at about 5 miles from shore there are from 9 to 12 fathoms water, and the 100-fathom line is more than 20 miles out. The bottom is usually of mud or mud and sand when near the beaches, and the water has a whitish color.

The gulf of Huelva is much dreaded by mariners, especially in winter, with all southerly winds, which raise a short high sea, made more disagreeable by the shallowness of the water. Under such circumstances it is dangerous to allow a vessel to fall within the line joining cape St. Mary and Chipiona point, as the force of the sea and the velocity of the currents setting shoreward drift the ship almost imperceptibly and cause many wrecks. If drifted into the gulf and unable to work out of it, when it is evident that the vessel cannot be saved, there is nothing for it but to run her ashore between the towers of Figuera and Salabal, or between the tower del Oro and the house of Calvador, when at least the lives of the crew may be saved.

From the mouth of the Guadiana to Chipiona, the south point of entrance to the Guadalquivir, the coast forms a bay 57 miles across and 10 miles deep to NE. The most prominent features in the land are Monte Gordo, high and conspicuous, about 5 miles E. of the Guadiana, and a hill a little eastward of Chipiona point. This bay fronts the provinces of Huelva and Seville, the latter being separated from the province of Cadiz by the Guadalquivir. Several rivers discharge their waters into the gulf of Huelva, but they are only navigable by coasters on account of the shifting and shallow bars. The only exception is the bar of Huelva, which can be crossed by a vessel drawing 18 feet under favorable circumstances. The coast consists of low sand-hills, and there are several small towers at intervals along the shore.

Coast. From the mouth of the Guadiana river (page 191) the coast runs E. about 13 miles to the entrance of Las Piedras river. Between the western point of Canela island and Ayamonte are the mouths of two creeks, which run eastward parallel with the coast. They are almost dry at low water, but navigable for the boats of the coast with a flood tide. These creeks, with the channels of the bars of Higuereta and Tuta, divide the coast into several islands and sand-banks. The southern creek leads to Higuereta, and the northern passes by that place, which is 4 miles from the Guadiana and continues on 5 miles farther to the bar of Tuta. The islands of Canelas and Cabeza de Enmedio are farthest west, lying N. and S. of one another, and east of them is Christina island.

Higuereta. The fishing village of Higuereta is on the western side of Christina island, and in the channel abreast there are 3 to 3½ fathoms water at low tide, when there are only 3 feet upon the bar. Vessels of not more than 100 tons go there loaded with staves, salt, &c., and load with salt fish, dried fish, and fruit.

Bar. The bar is formed by shoals extending southward from Cayman point, Christina island, and southeastward from the SE. point of Canelas island. These shoals uncover at low water, nearly closing the entrance. The direction of the channel is very variable on account of the shifting sands, and the water breaks over the whole bar with the least sea, so that it can only be passed with a smooth sea and under the most favorable circumstances.

Lights: Lat. 37° 12′ N.; long. 7° 18′ W. On the western end of Christina island are two lights on iron columns, which are fixed in movable cradles and shifted so that the lights in range always show the route to follow in crossing the bar. These two *fixed green* lights are elevated, the northern 50 and the southern 33 feet above the level of the sea, and are visible 5 or 6 miles in clear weather.

Leading marks. In making the entrance to the Guadiana coming from the eastward, the Catalan tower on a small hill near the mouth of Las Piedras river, the town of Higuereta, and then Ayamonte and the Canelas tower, will be made out. Coming from the westward, the light-house on cape St. Mary, and the town of Tavira; and coming from seaward the Canelas tower, Villa Real, and Ayamonte will show the position of the entrance. The spire of the church of San Salvador in Ayamonte can be seen from a long distance seaward. The marks are the same for Higuereta.

Tides

The establishment at the entrance of the channel to Higuereta is 1h. 54m., and a little later at the anchorage. The rise at springs is 12 feet, and at neaps 5 feet. There is a considerable increase in the height of the tide, with winds from SE. to WSW. through S., and a corresponding decrease with off-shore winds. The velocity of the tidal current is from 1 to 2½ miles.

Pilots.

Pilots always are on hand, and board vessels that signal for them. Their boats are distinguished by a *blue* flag with a *white* P in the middle. If unable to cross the bar and come out, the pilots signal the vessels from within the breakers to keep outside.

Christina island.

Higuereta or Christina island is now a sandy peninsula more than 4 miles long E. and W., and connected with the mainland by a narrow neck of sand, which may be waded across at low water. The island is so low that in equinoctial spring tides it is almost inundated, and the streets and houses of the town are flooded. Brooks extend from the creek on the north side, to Redondela and the surrounding farms. There is a small fishing-village on the western part of the island.

Catalan tower.

The Cabezo de Chirina is a small hill NE. of the bar of Higuereta, and is easily recognized, as it has a little patch of verdure on its summit. Nearly E. of this hill is another, of reddish color, nearly at the water's edge and on the west bank of Las Piedras river. On the summit of this hill is the round Catalan tower, the most remarkable edifice on this part of the coast. It is visible a considerable distance from seaward, and is a good mark for approaching the bar of Terron.

Las Piedras river.

Las Piedras or Terron river rises in the province of Huelva, has a course of about 20 miles in a southerly direction, and is navigable as far as Vado, 7½ miles from the bar. The shores are low, and partly swampy, partly cultivated. The coasting-vessels, some of 150 tons, which enter this river, anchor in mid-channel in 12 to 14 feet water, but when they are light they sometimes lie in the mud off the tower of Terron on the right bank.

The town of Lepe, with a population of 4,000, is about 1½ miles W. of the river; it has a moderate coasting-trade, and there is a custom-house there.

Cartaya, with 5,000 inhabitants, is E. of the river, and has ferry communication with Lepe. At both these towns provisions may be obtained and needful repairs made.

Bar. The bar of Terron lies between the banks bordering Gato point and the western end of Levante island, and which are gradually advancing to southeastward, the direction of the channel. The depth at low water on the bar is about 5 feet, and at high spring tides 16½ feet, and the bar is about 125 yards wide. Vessels drawing 9 to 11 feet can enter at half flood, but never with the ebb.

Marijato bar is formed by the eastern end of Levante island and the coast, and leads into the channel north of the island; it dries at low water, and is at any time only practicable for small boats.

Tides. High water, full and change, on the bar of Terron is at 2h., and abreast Cartaya 3h. p. m. The average rise is 11 feet, and the velocity of the current is about 3½ miles an hour in spring tides, increasing somewhat during freshets.

Lights: Lat. 37° 13′ 40″ N.; long. 7° 08′ W. At a place called Rompido de Cartaya, on the east bank at the entrance of the river Piedras, is a whitish conical tower with a green lantern, which exhibits, at an elevation of 81 feet above the level of the sea, a *fixed white* light varied by a *flash* every *four minutes*, and visible 14 miles in clear weather.

Lat. 37° 12′ 48″ N.; long. 7° 07′ 44″ W. Besides the above light two *fixed white* leading-lights placed on white poles (which answer as leading-marks during the day) show the direction of the channel. These lights are about 328 yards apart, and are shifted in position as the bar changes so that the two poles or lights in one lead over the bar. They are visible 4 miles, but there is a project to increase the brilliancy of the lights and buoy the channel.

The river should only be entered in fair weather and with a smooth sea, and a pilot should always be taken unless locally familiar.

Huelva bay. The bay of Huelva is the basin comprised between points Umbria and Picacho and the mouths of the Tinto and Odiel rivers. It is filled with islands and sand-banks intersected by narrow channels leading into the rivers, with a depth of 2 to 5 feet in them at low water. These banks form a chain extending about 7 miles parallel with the coast, leaving the main channel between, with a width of 3 to 6 cables. The length of the basin from its entrance to the anchorage of Huelva is a little more than 10 miles, and the depth of the main channel is from 12 to 80 feet at low spring tides, with sand or sand and mud bottom.

Umbria point and tower, the western extremity of the bay of Huelva, is 6 short miles to the SE. of the bar of Marijato. The point is low and wooded and terminates in a bank extending 2 miles SE., parts of which uncover at low spring tides. There is a shallow channel through the bank near the point, that is used occasionally by the fishermen.

On the east side of the point, within the entrance, is the island of Saltés, about 2¼ miles in length, the southeast extreme of which is the west point of the main entrance to the Odiel and Tinto rivers. From the south side of the island Manto bank, cut by several channels, extends 7 miles SE. It largely uncovers at low water, follows the direction of the coast, is connected with the sand-bank bordering the coast east of point Picacho, and forms the true bar of the rivers. At high water it is covered, and is then only noticeable when there is considerable wind or sea; the eastern side is steep-to, while west and south of the bank the water deepens very gradually. Between Manto bank and the one off point Umbria is the Umbria channel, with 4 to 19 feet water in it, and the former is also cut by several small and unimportant channels with from 2 to 5 feet in them at low water, leading into the rivers; these channels are named Ladrillos, La Gola, and Padre Santo.

North of Saltés island lie Bacuta and several other islands and flats intersected by channels, and all to the westward of the rivers.

Odiel and Tinto rivers.

Odiel river, rising in the high lands of the province of Huelva, flows south, and is navigable from its mouth to the city of Huelva, a distance of about 3 miles. Above this point the breadth of the channel diminishes rapidly, and in summer the river-bed is nearly dry. Boats ascend as far as Gibraleon, a town of 4,500 inhabitants, 8 miles above Huelva. Abreast Burro channel, which washes Saltés island on the north, the Odiel is 6 cables wide at high water; a little above the channel is considerably narrowed by Ballena bank projecting from the eastern shore, and above this it preserves a width of 4 to 5 cables to the anchorage off the mole of Huelva, where there is a depth of 8 to 21 feet water, mud.

The Tinto river rises in the eastern part of the province of Huelva, near some rich copper-mines, and, after a southeasterly course of 54 miles, joins the Odiel, and empties into the basin of Huelva abreast Saltés island. At the confluence of the rivers there are 14 fathoms water, and in the channel of the Tinto 6 fathoms, diminishing gradually to abreast the town of Palos, 3 miles up the river, where the depth is 8 to 14 feet. Small vessels ascend the river 10 miles, taking advantage of the tides. At this point there is a pier where they load, and this is the depot for the products of Lucena, Bonares, Almonte, and other towns. A little within the entrance of the Tinto, and on the left bank, stands the convent of Nuestra Señora de la Rabida, interesting from the fact that here Columbus staid in 1486, when he left Portugal for Spain to present to the king a project for a new route to India, which resulted in the discovery of the new world. This convent stands on a hill about 125 feet high, showing from the south reddish cliffs, which, with the building, form a good mark in recognizing the position of the rivers from seaward.

Palos.

Palos is a small town, about 3 miles from the mouth of the Tinto, on the left bank. It is so low and hidden by the downs that it is not seen until abreast of it. It has a population of about 1,100, and is of little commercial importance, but it is celebrated and interesting, because here the vessels of Columbus were fitted out, and from here he started on his first voyage to America, August 3, 1492.

Moguer.

Moguer is 5 miles from Arenilla point, on the left bank of the Tinto. Agriculture, flour-mills, brandy-distilleries, a few hand-looms for coarse linens and hempen stuffs, are the chief means of employment. Oil, wheat, &c., are imported, and wine, the principal production of the district, exported. Population nearly 8,000. Vessels not larger than 50 tons reach Moguer easily by keeping close to the east bank, where they can track if the tide and wind are against them. Above Moguer the Tinto is divided into several streams, and on them are many villages of some importance.

Huelva. The city of Huelva, capital of the province of the same name, with a population of nearly 10,000, stands on the left bank of the Odiel river, 3 miles from its mouth. It is built partly on the low land of the river's bank and partly on the hills in rear, is of growing commercial importance, on account of its exports of copper-ore and manganese, salt, tunny, &c., and has manufactures of rope, sails, blocks, and other articles for shipping. There are docks and ship-yards at Huelva, where vessels of all dimensions, men of war, and merchantmen, are built; good wood for this purpose is abundant in the surrounding country, and there is every facility for repairs here. Provisions are abundant and good water is obtained from numerous wells and springs, but the river water is not very good. A wooden mole on stone piles is 3 cables north of Calzadilla point, and on it is a light. The building yards and docks are between the mole and point.

The anchorage is SW. or W. of the mole in 19 to 22 feet, and is safe in any weather. Vessels moor on account of the tide, which runs 1 to 3½ miles an hour.

Bar. Arenilla point is the south point of entrance to the Tinto, and on it there is a circular tower with a white house to southeastward. From here the coast trends SE. to Picacho point, generally flat, but with occasional small hills. At 3 cables north of Picacho point are a few fishermen's huts, and 5 cables farther WNW. is the (white) custom-house.

Nearly west of Picacho point is the bar, which is so constantly shifting that no reliable description can be given of it, and strangers should not attempt to cross it without a pilot. Inside the bar, however, are two beacon-lights which are changed in position as the ship-channel varies, so that the lights in line lead across the bar.

Lights: Lat. 37° 08' N.; long. 6° 50' W. On Padre Santo point, on the eastern shore of Huelva basin, two *fixed white* lights are exhibited at an elevation of 17 and 27 feet above the level of the sea, and are visible about 8 miles in clear weather. These lights are nearly 1½ miles from the outer part of the bar, and when in line lead in the deepest water. The sand-bank on the western side of the entrance is marked by a buoy, which can be seen at some distance. The light-keeper's house is near the lower light.

On the extremity of the mole, opposite Huelva, at point la Cruz, there is displayed at an elevation of 20 feet above the level of ordinary high tides a *fixed* light in a spherical lantern, the upper half of which is *white* and the lower half *red*.

On the mole of Huelva, *three fixed white* lights are exhibited during the earlier hours of the night. These latter are not lighted when there is moonlight.

Tides. The time of high water, full and change, at the anchorage of Huelva, is 2h. 6m., and at the bar 1h. 54m.; and the rise is from 5 to 14 feet. The direction of the current is with the channels, but at the confluence of the rivers tide-rips and eddy-currents are formed.

Pilots. Pilots are always found near the bar. They go out in feluccas and fly a *blue* flag with the letter P in the middle. The national vessels are not obliged to take a pilot, but strangers should invariably do so. In fine weather the pilots go about 3 miles outside, but in heavy weather they keep in the channel, sheltered by the banks.

Directions. In approaching Huelva the land is generally so low that great precaution is necessary. In coming from the east or from the strait of Gibraltar, Cadiz, and then the Alto de Beva or Chipiona would be seen, and the course then steered for the Cerro del Puntal, which is about 2 miles N W. of Picacho point. In fine weather the Oro tower will be seen, and from this the Cerro del Puntal is visible, and should be brought to bear N. to approach the entrance. Coming from the W. after sighting St. Vincent or St. Mary, steer for Umbria point, and after making out the position of Huelva bring the Cerro del Puntal to bear N., distant about 3 miles, and lie to for a pilot. If too late in the day to enter, and if the weather be fair, anchorage may be taken in 9 to 11 fathoms water, south of the lights.

It is always imprudent to enter without a pilot, as the shifting of the sands is so rapid that even the alignment of the beacons cannot be depended upon, and the pilots are obliged to sound constantly and change the buoys and leading-marks when necessary. But in case of necessity, to cross the bar;—from about 3 miles S. of the Cerro del Puntal bring the beacons in line, and steer on that course until between 1 and 2 cables from the beach, keeping then along the beach and close enough to it to clear that part of Padre Santo bank, which is opposite Caño point. After passing the latter, mid-channel may be taken, nearing the shore again at Arenilla point to avoid the bank off Saltés island, then with the church spire of Aljaraque (which is nearly 4 miles WNW. of Huelva) bearing N W., steer for it, until Burro point bears between SW. and SSW., when head for the anchorage. In fine weather the navigation in this long channel is simple, but, in bad weather, at high tide, the sea rolls over the banks, making a cross-sea.

Coast. Point Picacho is sandy, somewhat prominent, and overlooked by downs of moderate height. Thence the coast describes a curve, the general direction being SE. for 27 miles, to the entrance of the Guadalquivir. It is safe all along, and the depth at 2 or 3 miles distance is 4 to 8 fathoms.

Nearly 7 miles SE. of Picacho point, and at the eastern extremity of a shallow bight, is the tower of Oro, on a sandy point, so low that the tower is isolated at high water. Its base is of a reddish color, and seen from a distance it appears like a rock or a wreck. At this tower commence the Arenas Gordas, sandy downs that extend 16 miles SE. to the tower of Carbonera. These downs or cliffs are so close to the seashore that there is scarcely passage-way between the foot of them and the sea at high water. Asperillo and Higuera towers are between those already mentioned, but the former has almost completely disappeared. This stretch of coast is extremely dangerous with gales from seaward, for in case of shipwreck it is almost impossible to save the lives of those on board. Higuera tower, too, is almost demolished, only its base remaining.

Carbonera tower is low, large and round, and is on the eastern slope of the Arenas Gordas. It is occupied, and in its immediate vicinity are a few fishers' huts. Near it is a white custom-house, easily distinguishable. At 3 or 4 cables from this part of the coast there is a depth of 7 fathoms, and at 2 miles this only increases to 8 fathoms.

At 3¾ miles SSE. of Carbonera tower is the tower of Salabal, the coast between being low, with some forest trees visible in the interior. This tower is round, white, and quite high, and is surrounded by trees. It is easily overlooked, as its whiteness confuses it with the sands.

At about 4 miles SSE. ½ E. from Salabal tower is the tower of San Jacinto, round, and built near the sea-shore, between sand-hills, and is partly hidden by the woods. The coast between is low, nearly straight, and backed by low hills and pine forests that cover the whole peninsula that terminates in Malandar point at the mouth of the Guadalquivir.

Between the San Jacinto river and Malandar point the coast is fronted by a large sand-bank extending more than a mile to SW., the end of it being marked by a buoy in 1 fathom water; it is called San Jacinto bank. The low sandy peninsula that terminates in Malandar point forms for some distance the right bank of the Guadalquivir; the pine groves on it are called Coto de Oñana, or Marismilla, and can be seen before the low land of the coast is made out.

Lights: Lat. 36° 47′ 36″ N.; long. 6° 21′ 53″ W.

On the extremity of Malandar point there is a square white building, from the center of which rises an iron column, which displays at an elevation of 36 feet a *fixed white* light, visible 6 miles in clear weather. This light, which is a leading mark in crossing the bar of the Guadalquivir, is scarcely seen until quite near.

Lat. 36° 48′ N.; long. 6° 20′ 6″ W.

Across the river and about ENE. from the above light, at a distance of 11 cables from it, is the Bonanza light, a *fixed white* light elevated 52 feet above the level of the sea, and visible 7 miles in clear weather.

Guadalquivir river.

This river, the Betis of the Romans, rises on the borders of Murcia, in the mountains of Alcaraz and Segura; it intersects Andalusia, draining all the northern portion; it rapidly increases in size by the accession of numerous tributaries on both sides, and after passing the town of Andujar its course is to the SW. to Cordova and Seville; it then takes a S. and SSW. direction, and at some distance below Seville is divided into 3 branches by the islands Minor and Major; these branches reunite below the latter island and the river forms a harbor above the San Lucar de Barremeda, near its mouth, emptying into the sea between the peninsula above described and Chipiona after a sinuous course of 270 miles. It is navigable up to Seville, about 70 miles, where it is spanned by a bridge, beyond which the influence of the tide is slightly felt.

The river becomes swollen by the melting snow and is retarded in its course by high tides; inundations ensue that cause great ravages and serious loss to the inhabitants on its banks; vessels are thus sometimes carried to a distance from the river, and unless care is taken are left high and dry when the waters retire.

At certain seasons of the year the river is navigable for vessels of 100 tons as far as Seville, the capital of the province; but ordinarily vessels of more than 10 feet draught are obliged to load and unload about 8 miles below the city.

Above San Lucar the river-banks are low and muddy, with occasional salt-marshes that are worked in part, and its width varies from 2 to 5 cables. Above Minor island the river narrows, and the banks are higher and less frequently inundated; they present a pleasing prospect of houses, villages, gardens, and farms, abounding in herds of cattle, &c. At Corta a canal commences, which renders unnecessary a detour of 8 miles and a difficult channel, and along the banks of this canal are the farms of la Compañia. Above Corta the river is narrower and occasional shoals are met. The banks gradually rise, so that floods do not occur, and the country on either side is of great richness and fertility.

At Coria the river passes between two walls 243 yards apart, with a depth of 12 to 19 feet at half tide. Above Coria, the navigation of the river becomes more and more difficult, on account of the shoals and the smallness of the tide. Before reaching Seville, the villages of Gelves and San Juan de Aznalfarache are passed, built partly on heights, and surrounded by magnificent gardens of orange-trees, &c.

San Lucar.

The city of San Lucar de Barrameda lies south of Malandar point, on the opposite shore of the river. It is 1 mile long from NE. to SW., and has a fine appearance from the general white color of the houses as well as from the spires, the highest of which is that of the cathedral. The inhabitants of the city and suburbs number 20,000; the surrounding country is low, sandy, and well cultivated, and only to the S. and SE. are seen a few hills, among which is the Cerro de la Atalaya. San Lucar is the capital of the maritime district of that name, and the residence of the maritime authorities. The chief employments of the people are the manufacture of casks and liquors, working in the tanneries and cotton-mills, and fishing. There is no quay at

San Lucar, and a landing can only be effected when the sea is smooth. Its true port is Bonanza, where steamers can lie alongside the pier, and where there is a large custom-house.

Anchorage. Vessels trading with San Lucar, and those awaiting a favorable tide to ascend or to go out of the river, anchor NW. of the quay of Bonanza. This anchorage is very safe, protected from all winds, and free of any inconvenience unless from the current of the river. The Cadiz steamers make fast to the pier, or to one of two mooring-buoys off it. Other vessels moor in mid-channel in 3½ to 6 fathoms water, sand, unless waiting for a tide, when one anchor is used. Near the opposite shore, off the Marismilla tavern, small vessels can anchor in 1½ to 2 fathoms, at 1 cable from the beach, where they are well protected from SW. winds and are somewhat out of the strength of the current.

To the north of Bonanza are the pine groves of Algaida, and farther north on the river's bank are salt-works, some of them abandoned. A large house at the salt-works of San Carlos, 2 miles N. by W. from the Bonanza quay, is a leading mark for the anchorage.

Provisions are obtained from San Lucar, and water from a well near the quay, or from the wells of the Marismilla tavern.

Castles. A little more than half a mile SSW. from the Bonanza pier is the castle of San Salvador. It is on the beach between the sand-hills, so that it is scarcely noticeable. There is a building with whitewashed walls in the center, and sentry-boxes on the western face. The old convent of San Geronimo stands on a height a little to the right of it, and helps in making out the castle, which is one of the leading marks for the anchorage.

The ruined castle of Espiritu Santo is 6 cables W. of San Lucar, on a point which is projecting, rather low, reddish in color, rocky, and terminating in a chain of rocks and shoals which extend nearly across and form the inner bar of the river. The fort is easily confounded with the cliffs of the point when approaching from the westward.

Colom tower is 1½ cables S. ⅜ E. of the Espiritu Santo light-house, and in daylight the two in line show the direction of the chain of rocks and reefs above mentioned.

Point Montijo, 2 miles W. of the castle point, is flat and rocky, with a chain of rocks extending out 3 cables. It may be recognized by a house on its summit. The coast between these two points is unsafe.

Chipiona point and town.

Chipiona or Perro point, 2 miles SW. of point Montijo, may be considered the S. point of entrance to the Guadalquivir. It is low and sandy, and is overlooked by a sand-hill named Perro hill, and it terminates in a chain of rocks which extends 4 cables to westward, and almost entirely uncovers at low water. There are 1 to 2 fathoms water around the edge of these reefs, and a little shoal named Embozado is 1 cable NW. of them. The NW. extremity of the Perro reefs is marked by an iron staff planted ½ a cable from the Embozado.

The town of Chipiona lies a short distance E. of the point, and is fronted by a reef extending 3 cables to the N. The corrales (fisheries) of Chipiona are on these rocks, which uncover at low water with 1½ to 1¾ fathoms at their outer edge, and the reef extends along shore as far as Montijo point.

The town numbers 2,150 inhabitants, and is easily recognized by the principal church-spire, terminating in a pointed dome. It is built on the sea-shore, and is the station of the pilots for the bar of San Lucar. Pine timbers from the adjacent forests are exported. The convent of Regla, (page 215) which is 6 cables S. by W. from Chipiona, will aid in recognizing it, and the two are marks by which to clear the Salmedina and other reefs to the westward.

Lights: Lat. 36° 46′ N.; long. 6° 22′ 42″ W.

At 1 cable S. of the castle of Espiritu Santo there is a square, white house, from the middle of which rises an iron tower, where a *fixed red* light is displayed, not visible from the offing. In entering it is visible when it bears from the vessel SE. by E., the outside direction of the Muelle rocks, and when it bears S. ¼ W. from the vessel she is inside the Riza spit.

Lat. 36° 44′ N.; long. 6° 26′ 46″ W.

On the Perro ledge and about 45 yards from the sea stands a yellowish stone tower adjoining the keeper's dwelling, from which is displayed, at an elevation of 220 feet, a *white* light which is eclipsed *every minute* and is visible 22 miles in clear weather.

Dangers.

Salmedina bank is 1½ miles W. ¾ S. from Perro point light-house. It is a dangerous rocky ledge, 3 cables long from NW. to SE., and 1½ cables wide. It dries at low water, and the sea almost constantly breaks on it. Its two extremities are marked by iron bars, which are to be replaced by cast-iron beacon-towers. A light-house is also building on this reef.

From the SE. extremity of Salmedina rocks a chain of rocks called Erizal reef extends to the SE. It is always covered, and forms with the Camaron rocks a channel 1 mile wide and 1¼ to 3 fathoms deep. Large vessels should always pass outside.

Outer ledge and Middle ledge, the former always covered and the latter awash at low water, lie between Salmedina rocks and Perro point. Middle ledge is marked by a buoy at its southern extreme.

Baxo Picacho is the most dangerous ledge off the entrance of the river. It is the summit of the rocky plateau which almost fills the bay at the mouth of the Guadalquivir, and itself terminates in a point with 1 foot water over it; the bottom around is rock, with thin patches of sand. From it the eastern angle of Chipiona fort is in line with the southern angle of Regla church, and the low eastern wall of Espiritu castle in line with the gate of the Capuchin convent, a remarkable building at the SW. extremity of San Lucar, and 5½ cables E. by S. from the castle.

Pavona bank, 3 cables NE. of the preceding, has 1½ to 2 fathoms water on it at low tide. This bank is SW. of San Jacinto bank.

Baxo Juan Pul, about 3 cables NE. of the eastern extremity of Baxo Pavona, is a rocky plateau less than ½ a mile in extent E. and W., and is marked by a conical buoy. It lies 6 cables from the beach, off the tower of San Jacinto, and the channel between carries 2¼ to 2½ fathoms.

Baxo Pollero is outside the bar, and 12 cables NW. by W. ½ W. (westerly) from Espiritu castle, with 1 fathom over it and 2½ to 3 fathoms around it. It is dangerous for large vessels, as it is only about ½ a cable north of the course steered in entering. Its southern side is marked by a buoy, which, however, is often swept away.

Baxo Galloneras is 4 cables SSW. of the preceding, with 1¼ fathoms water over it, and is about 2½ cables south of the route of vessels. This bank, the Pollero, and the Juan Pul, are in line with the San Jacinto tower and equidistant from one another. They are summits of a chain of rocks extending across from Montijo point, and are to be removed by blasting.

Baxo Carrion is a small shoal with little water over it, about 2 cables W. by N. from the buoy of the Muelle rocks.

The Muelle rocks, a chain of peaked rocks commencing at Espiritu Santo point, extend thence 3 cables N. They almost all uncover at low water, and are marked at the northern extremity by an iron staff and vane.

Riza spit is a continuation of the Muelle rocks to the north. It never uncovers, and is marked at the northern edge by a buoy. Between the extremity of this spit and the bank extending from the opposite shore, there is a channel only 2½ cables wide, and 4 to 7 fathoms deep in the middle. This is the entrance to the Guadalquivir. A small boat channel also crosses the Riza. From the northern extremity of the Riza, Espiritu Santo light-house is in one with Colom tower, and Chipiona fort, in line with the house on Montijo point. During the night a vessel is in the line of prolongation of the Riza when Espiritu light disappears.

Riceta patch, 8 cables E. of the head of the Riza, is in mid river, S. by E. of Malandar light, in line between the light and the chief church spire of San Lucar. It is marked by a conical buoy, which is left to starboard in entering; and, finally,

Alcantarilla and Anzuelos ledges lie off the beach of San Lucar, and are awash at low tide.

Bar. The bar of San Lucar to the northward of the Riza spit, is only available for vessels drawing less than 13¾ feet, for while 20 to 27 feet are found in the channel at high spring tides, there are places where the lead gives but 16 feet at neaps.

Tides. The time of high water, full and change, on Salmedina bank is 1h. 27m., at Chipiona 1h. 34m., on the bar and off San Lucar 1h. 53m., and at Bonanza 2h. The tide rises 10 feet at springs and 3½ to 4 feet at neaps; at the equinoxes the rise is greater. With the *vendavales* the rise is greater and the time of high water is retarded, and the contrary effect obtains when there is a gale from NE. to SE. The stream runs 3 miles an hour during spring tides, and 1½ miles during neaps.

During a freshet, the velocity of the flood-current is diminished, while the ebb attains a rate of 5 to 6 miles an hour. It is shown when there is a freshet in the river by the reddish color of the sea for 5 or 6 miles out, and in such a case a vessel should not attempt to enter unless with a leading wind sufficiently strong to keep the vessel well under control. In the freshets there are two currents at the entrance of the river during flood-tide; one, the regular flood-current setting in along the coast by San Lucar, and the other setting out along the opposite shore.

Pilots. In good weather pilots are always found off the entrance, or will come from Chipiona, where they reside, if signaled for. The river-pilots are at San Lucar. The pilot-boats fly a *red* flag with the word PILOTE in the middle; the same word is painted on the bows of the boats.

Directions. Coming from seaward, the position of the river will be recognized by the gap in the shore-line; to northward, the coast is black and low, with a beach covered with sandy downs, and pine forests in rear; to southward, it is higher. At the entrance the low wooded lands of the seaboard are backed by low hills crowned by white houses, which show over and beyond the city of San Lucar, and contrast strongly with the low land in the foreground. The white buildings of San Lucar stand out in bold relief from the surrounding lands, and, a little farther south, those of Chipiona and the Regla convent appear, and form the chief landmarks in approaching the bar. Beva hill and tower, about 3 miles SE. of Chipiona, will also be seen.

Coming from N. or S., the coast will be kept in sight, and the port readily known.

Before reaching the shoals off the entrance, say with Espiritu Santo castle bearing E. and Salabal tower N. by E., when the vessel will be 4 miles from Malandar point, bring the Malandar light-house in line with the light-house at Bonanza. This latter mark is easily found, as Bonanza is the only village or group of houses in sight N. of San Lucar, and the light-house is the most northern house, and the nearest to the quay. With these two light-houses in line bearing ENE. $\frac{1}{8}$ E., nearly, steer for them until the Espiritu light-house is in one with the Colom tower, when the vessel wil be N. of the Riza; and then head for the castle of San Salvador, passing Malandar point at about 1 cable's distance. On reaching the middle of the river, or when the house at the salt-works of San Carlos, on the western bank, comes in sight, follow the middle of the channel to the anchorage NW. of the quay of Bonanza. With a large vessel bring the Malandar light-house in line with the SE. angle of the custom-house a little before reaching the Riza spit, which will give the greatest depth of water.

At night, a little before reaching the meridian of Perro light, bring the Malandar and Bonanza lights in line and steer for them until the red light of Espiritu disappears, when the vessel will be N. of the Riza; then head E. ½ N., easterly, and when in mid-river, or when Bonanza light bears NE. ½ E., steer NE. by N. until Bonanza light bears SE., and anchor.

The entrance of the Guadalquivir cannot safely be attempted without pilots unless by a steamer or with a good fresh breeze, for the courses steered lead so close to some of the dangers that the least deviation from the route, occasioned perhaps by currents, or by any other cause, becomes extremely dangerous. The top of high water should be chosen as the time for entering so as to have the advantage of the deeper water, and the slack, and few reasons can justify an attempt to enter against the ebb current. As there is nowhere less than 2 fathoms at low water in the channel, the lead will usually show any deviation from the route, and in such a case a vessel should anchor immediately. If, in approaching the Guadalquivir, the fog becomes thick enough to hide the land, as ordinarily happens with winds from seaward, when, too, the shoals form one vast breaker, it is more prudent to go to Cadiz and await more favorable weather, but if too far within the entrance to retreat, the hatches should be battened down, everything secured, and the vessel headed fairly for the bar, in crossing which she will probably receive some heavy blows from the waves. Vessels drawing 11 feet can always enter unless there is a heavy sea running, but those of greater draught should always wait for high water.

Outer anchorages. In fine weather vessels may anchor off the entrance of the river in 4½ to 6 fathoms water, sand and mud, to wait for daylight, and it is always preferable to do so if possible, rather than run the risk of being set by the current on to the outer shoals. Few vessels, except coasting-steamers, enter at night, and they always carry a pilot. There is good anchorage in 7 fathoms with the church of Regla bearing SSE., and the principal church of San Lucar E. ½ S.; or, at night, with Perro light SSE. and Malandar light E. by N., a vessel will be outside the banks and sheltered by the land, but if bad weather threatens from seaward it is better to stand off and on.

The Grajuela anchorage, an excellent shelter from winds from S. to NE. through E., in 4½ to 6 fathoms water, good holding-ground, is off the beach of Chipiona, with the church of that town bearing S. and the house on point Montijo E. by S.

Port of Seville. The port of Seville commences 2 miles N. of Alfarache, or at point Remedios, is 10 cables long, and from 110 to 128 yards wide, and terminates at the north at the Triana bridge. Vessels moor in line along the eastern bank at a place called the Barranco, between the bridge and the custom-house wharf. The depth in the basin is 1¼ to 2 fathoms water, ooze. Numerous piers extend along it, chiefly on the E. bank. That of the steamers which ply between Seville, Cadiz, and other ports, is near the Tagarete canal, and a short distance beyond is the palace of the Duke of Montpensier, surrounded by vast gardens that extend as far as the port.

Seville. Seville lies in the middle of an extensive plane on the E. shore of the Guadalquivir, and communicates with its faubourgs on the opposite bank by an elegant bridge of iron and stone. It is the capital of the province and of the maritime district of the same name. The population of the city and suburbs is 118,298. The old city is surrounded by a thick wall of Roman origin, repaired by the Arabs and the Spanish, where there are 167 turrets and 15 gates. Among the most noticeable buildings are the cathedral, Giralda tower, which is the most beautiful and the highest in Spain, the Sanque hospital, the Alcazar, &c., and many palaces. There is a foundery of bronze and brass ordnance of superior quality, and muskets, saltpeter, and powder are also made. Machinery, earthenware, crystal, silk and linen goods, hats, soap, and leather, are all manufactured, but the qualities are generally inferior. The manufacture of tobacco is extensively carried on outside the walls. The principal exports are wool, oil, leather, silk, quicksilver, copper, lead, and fruit; and the imports are hardware, iron, cloth, timber, butter, and cheese. The commerce is considerable.

There are immense markets, abundantly supplied with provisions, and good water may be obtained from springs on shore. The river-water, though a good deal used, is generally brackish and never very good. There are docks at Seville and all facilities for repairs.

Tides. There is a successive retardation of 7 hours between Bonanza and Seville, the time of high water at the latter being 8h. 30m.; the rise is 3½ feet at springs, with an increase during the *vendavales*, and a decrease during the land-winds. Highest tides here are always 3 days after full and change.

Winds. The prevailing winds are from the westward, but the worst both for health and for the soil, is the east wind, which is named the *Solano.* It is drier and hotter than at Cadiz, causing a suffocating heat in summer. Happily it only prevails in spring and summer. When it blows in winter, it is strong, dry, and cold, but of short duration. When it hauls to SSE. and SE., it soon shifts to SW. and brings rain.

Anchorage. Vessels may anchor anywhere in the river, though special points are usually selected. Ships of 300 to 400 tons usually remain just below Minor island, where the depth is 14½ to 16½ feet at low water, and those of 200 to 300 tons go as high as the Ferdinand canal.

Sailing-vessels ascending the Guadalquivir should provide themselves with driving mallets and stakes to fix in the banks and moor to when wind or tide is contrary, so as to avoid anchoring. Tow-lines also are very useful, as many vessels track along parts of the river. Steamers make the trip from Seville to Cadiz and *vice versa* usually in 7 or 8 hours. The strength of the tide is in great part lost in some places by its distribution in the different branches. A project of damming the river, now in contemplation, will increase the speed of the current, and shorten the trip between Seville and San Lucar by 8 or 10 miles.

CHAPTER IX.

FROM THE GUADALQUIVIR TO CAPE TRAFALGAR.

Variation in 1871 19° 10′ *westerly; diminishing* 4′ *to* 5′ *annually.*

In this chapter is given a description of that part of the coast of the province of Cadiz lying between the Guadalquivir river and cape Trafalgar. The shore is generally low, and fringed by reefs extending from 2 to 5 miles to seaward, which must be given a good berth in heavy weather, but there are mountains in the interior, and, coming from the westward, the mountains of Ronda, Ubrique, and Medina are seen in clear weather.

Ronda, also named the Cabeza del Moro, is the highest peak of a considerable range, is somewhat rounded, and when brought to bear about E. by N., leads directly to Cadiz. Ubrique, or Ulrique, is not so far inland, and is nearly on the parallel of Cadiz, but is less easily distinguished than the preceding; from the summit of the peak the land falls in gentle slopes, interrupted by a small hill on the eastern side. Medina is pyramidal in form, and is not so high as the others. It is the nearest to Cadiz and about ESE. from it. A little below the summit there is a remarkable tower easily seen when off the entrance to the bay of Cadiz, and on the western slope is the town of Medina, which appears like a white patch.

Coast. Chipiona point and the adjacent reefs are described in the preceding chapter. From Chipiona or Perro point the low coast with sandy downs trends SSE., 6½ miles to Candor point, fringed by rocks and reefs; at 2 miles S. of Chipiona they extend off nearly half a mile; and at about ¾ of a mile farther on, is a rocky patch with 1½ fathoms water on it, lying ⅔ of a mile from the shore, with Beva tower bearing NE. by E. ⅝ E. Small coasters sometimes pass inside the Salmadien rocks in going to San Lucar, but no large vessel should do so, as smaller patches lie irregularly in the channel and are very difficult to avoid.

About 2 miles ESE. from Candor point is the town of Rota, at the entrance to Cadiz bay, the reefs between extending from ½ to 1 long mile from shore. To the NW. of Candor point the reefs form a little bight, where steamers and small craft sometimes anchor when easterly winds prevent their making Cadiz bay. Candor point is low and sandy, and the reefs off it belong to the corrales of Rota. The name corrales is given to the fisheries owned by divers proprietors on the reefs of the coast of Spain, and on the Rota reefs there are six of them. A house, called the Cuba, on the seaboard above Candor point, is the only remarkable building or object on this stretch of coast. A little inland and south of Chipiona is a pine forest, and about 3 miles SSE. ½ E. from Chipiona and 5 miles N. by E. from point Candor is the tower of Beva, standing on a high ridge of hills; it is a good mark for recognizing the coast, as it can be seen from a long distance. It is square, with a round cupola at the top, and stands between two square houses.

Regla convent, near Chipiona, comprises several buildings, one of them a church, and is remarkable by its size, spire, and whiteness. A group of palm trees is a little to SE. of this edifice.

In coming from the northward at night San Sebastian light should not be brought to bear to the southward of SE. until southward of Rota.

Rota. Rota, a town of 7,300 inhabitants, is on a point of the same name, that is the north point of entrance to the bay of Cadiz. It has a quay, on the end of which is a light, and where small craft come at high water to load with wine, fruit, &c., for Cadiz. This quay is dry at low water.

Cadiz bay. The bay of Cadiz, between points Rota and San Sebastian, on Leon island, is 5½ miles across. The coast trends to the eastward and southward from Rota to fort Matagorda, and here the bay proper connects with another shallow basin by a narrow channel. This second basin is surrounded by marshy land, intersected by numerous channels. Cadiz bay is open to winds from WSW. to WNW., but a succession of shoals lying between point San Sebastian and point Santa Catalina form a natural break-water and greatly protect the anchorages; between them are channels large enough for vessels of any class, and inside them the bay, about 3 miles in every dimension, is quite shallow, except a deep band or fosse, from 1 to 3 cables wide and with a depth of 5½ to 9 fathoms at low water.

This band or trench crosses the bay, passes near point Puntales, and enters the inner basin, forming a channel to Carraca a the San Pedro channel.

From Rota the bay coast trends E., SE., and SSE., to point Catalina de Puerto. E. of Rota are the Anaforas, a line of white cliffs, with a short reef extending off from their base; then the Merendero brook near the Gallina hill, where water may be obtained. A ruined battery is on the Gallina hill. The Salado river, which boats enter at high water, is between this hill and Puntilla point, on which is a battery, and which is prolonged under water by reefs extending off 3 cables. Then follow Bermeja and Huete points, steep, and fronted by reefs, the former having a ruined battery on it, and then a beach terminating in the point of Santa Catalina. On the beach are several houses and the ruins of one or two batteries, and 1½ miles inland is a hill with a telegraph tower on the summit, which is a leading mark for the pilots.

Puerto de Santa Maria.

Point Santa Catalina is steep, and reddish in color, with an unoccupied fortress of the same name on it, and the ruins of a battery a little to the northward. The reef here extends but a short distance out, with 1½ to 2¾ fathoms near the edge. The city of Puerto de Santa Maria is ENE. of Santa Catalina point, on low land, with many wharves along the Guadalete river. It is at the mouth of this river, (across which there is a bridge of boats,) has a population of about 18,000 and a considerable trade, particulaly in wine. Water-boats fill up here for Cadiz, and steamers ply between it and that city, and it is connected by railway with Xeres. Two lights mark the entrance of the river.

Guadalete river.

The Guadalete river, with its affluents, waters a large portion of the province of Cadiz, but is of little commercial importance, as there is only ½ a fathom at the bar, increasing to 2¼ fathoms off the city of Santa Maria at low water.

The bar is of shifting sand, and vessels only enter at high water.

San Pedro river.

South of the Guadalete the low, marshy lands bordering the bay of Cadiz as far as Cabazuela point encroach gradually on the bay under the form of sand and mud banks, insensibly diminishing its size. The San Pedro river is only a large channel leading SE., N., and E., cutting the road between Puerto de Santa Maria and Puerto Real. The depth on the bar at the entrance of the San Pedro is, at low water, from 1 to 2 feet only, with from 1 to 3½ fathoms inside. The Trocadero cut connects this river with the Trocadero channel which was formerly of great importance, is now partly filled in, and is disused except as a convenience in careening vessels, &c.

Puerto Real.

Puerto Real, on the main-land at the head of the bay, has a population of about 7,000; it is connected by rail with San Fernando, Puerto de Santa Maria, and Xeres. It has a mole, a slip, &c. It has tanneries, flour and oil mills, quarries of excellent building-stone, and lime-kilns. Its manufactures are coarse linens, leather, pottery, vermicelli, and starch; and its exports fruit and wine of medium quality.

Trocadero.

Trocadero stands on the projecting point of land near forts Matagorda and Luis, along the bank of the Caño or Trocadero channel, where there are still docks and marine establishments for the repair of shipping. One terminus of the railway is here.

Puntales channel.

The Paso de Puntales passes between the Cabazuela and Santo Domingo banks, then between Matagorda and Puntales points, and leads to Puerto Real, Carraca, &c. It is buoyed at the entrance, and beacons mark the route to Carraca. Puntales and Matagorda points are 6½ cables distant from one another, NE. by E. and SW. by W. On Puntales are the ruins of a fort, or rather there is an old wall washed by the sea at high tide, and Matagorda castle is simply a black mass entirely isolated at the same time.

Carraca.

Carraca, on the main, at the NE. entrance of the Sancti Petri, is the most important maritime establishment in Spain. It is the site of the royal dock-yard and arsenal, and was built in 1770, on piles, on a marshy island, surrounded by channels on all sides. The arsenal, at the NW. angle of the island, is 3,936 feet long and 1,968 feet wide; it contains basins, slips, docks, store-houses, and everything necessary for a great naval establishment; but it is not of so great importance now, and is in a poor state of efficiency.

The Carraca channel is marked by staff beacons, and gradually narrows and shoals until it enters the Sancti Petri. It is of great value on account of the security for vessels in winter quarters and the facilities for cleaning the bottoms of the larger naval vessels. The depth of this and the other channels is to be increased by dredging.

San Carlos. San Carlos is on Leon island, which is separated from the main by the Sancti Petri river. Near it is the naval college, infantry barracks, a hospital, and other prominent buildings, forming a group visible from Cadiz bay and from the offing abreast. The Cadiz railway passes north of the Suazo bridge on a viaduct north of San Carlos and San Fernando.

West of San Carlos, Canteras point extends to the northward, and terminates in a large and convenient mole, which is dry at low water. This point, high compared with the rest of the coast, may be recognized by several store-houses, a magazine, &c., which are on it. The mole is the landing-place in going to San Fernando, and between it and San Carlos, near the shore, are the lazaretto and the government provision store-houses.

San Fernando. San Fernando is S. of point Canteras, on the eastern shore of the isle of Leon, which is connected with the mainland by the draw-bridge of Suazo. The Camiño Real or high road from the bridge leads through it to Torre Gorda, and thence to Cadiz. Among the numerous prominent buildings of this town the Royal Observatory is farthest north. The platform of the chief building is 134 feet above the level of the sea, and it is computed to be in long. 6° 12′ 16″.5 W. of Greenwich. A little to the SSE. of the observatory, on another height, is Torre Alta, an old square tower 60 feet high, connected by telegraph with the Tavira tower at Cadiz. There are here numerous flour-mills and extensive salt-works, and manufactories of starch, leather, and vermicelli. Many of the inhabitants are fishermen, and the population, with the suburbs of Carraca, Sancti Petri, and San Carlos, is about 28,000.

Between Canteras point and the Cortadura, the commencement of the isthmus connecting Cadiz and San Fernando, there is no depth of water, the banks extending from the shore drying at low water for more than 1 mile out. The little Artillo river in this space gives the motive-power for one of the mills of the salt-works.

Puntales point. From the Cortadura the isthmus, at first very narrow and almost covered at high tide, extends NNW. First comes San Fernando fort, and then the isthmus widens to point Puntales, on which is the castle of the same name. The shores of the point are very low, and on them are ship-yards, a village, store-houses, &c., and vessels are often stranded here to examine or clean their bottoms.

North of Puntales point, between it and Vaca point, the coast forms a bight, along which are store-houses and buildings, where merchandise and goods subjected to quarantine are deposited, and a hospital used in cases of any epidemic disease. Toward the northern part is a rope-walk, and W. of it, on a height, the church of San José, with a double spire. On the shore are the batteries of Primera and Segunda Aguada.

Santo Domingo bank.

The bank NE. of Puntales point, and which, with Cabazuela bank, forms the Portales channel, is named Palma or Santo Domingo. It is a large plateau of sand and shells, and there are only 1 to 3 fathoms on it at low water.

The Corrales, a reef of rocks extending out 2½ cables and 12 cables long, uncovers in part at half tide, and is just off Vaca point, there being a little boat-channel between.

Cadiz.

Cadiz, the capital of the province of the same name, occupies the rocky and comparatively elevated extremity of a long, narrow, low tongue of land, which projects northward for about 5 miles from the isle of Leon, comprising between it and the main-land the spacious bay of Cadiz, with excellent anchorage.

The city was founded by the Phœnicians, and was the Gades of the Romans. The remains of a Tyrian temple of Hercules, with some other buildings of the ancient city, are still visible at low water. The Arabs conquered the city, and it was retaken by the Spaniards in 1262; it has been attacked by the English several times, successfully by Peterborough and Blake, and in 1810 it was invested by the French, but they raised the siege on the approach of the Duke of Wellington in 1812. In modern times it has always been politically conspicuous for the liberalism and prompt action of its inhabitants in the several crises of the Spanish constitution.

The access to Cadiz from the sea is almost impracticable from the rocks, ledges, and sand-banks by which it is surrounded; and being everywhere defended by ramparts, bastions, and detached forts, is almost impregnable. It is the most important commercial and seaport city of Spain, but has declined from the position it occupied in the glorious period of the Spanish colonial empire, when it was one of the chief maritime cities of Europe.

The streets of the city, though narrow, are straight, well paved, and lighted. The houses in general are lofty, with a court in the center, and built of white freestone. There are but few public buildings of importance, the cathedral being the most conspicuous. Along the ramparts is a fine promenade, known as the Alaméda, with an extensive view eastward of the different towns, and the mountains in the distance, and westward of the broad Atlantic. Seen from a distance Cadiz presents a magnificent display of snow-white buildings, though few of them are especially conspicuous. From its almost insular position it enjoys a mild climate, the mean annual temperature being about 64° Fahrenheit, while the mean summer and winter temperatures do not vary more than 10° above and below this point. From the same cause it labors under a deficiency of water that is either collected in cisterns, or brought, at a great expense, from Santa Maria, on the opposite side of the bay. Population about 70,000.

Wine is the chief export from Cadiz, and in 1865 the value of that shipped amounted to more than $10,000,000; metals, oil, dried fruits, cork, wool, live stock, &c., are also exported, and hemp, sugar, coffee, cacao, fish, and foreign manufactured articles, with tobacco, are imported. Regular lines of steamers connect Cadiz with the ports of the Mediterranean, Atlantic ocean, Cuba, Teneriffe, Porto Rico, Samana, &c.

The port of Cadiz is between point San Felipe and the mole of Cadiz. Between them are the quays of San Carlos and Seville, each leading to a gate; the custom-house and San Carlos fort. Vessels load and unload at these quays at high water. The mole of Cadiz is at the foot of the bastion of La Cruz; it is 656 feet long, very wide, and at the end of it is the captain-of-the-port's office, health office, &c. A smaller mole from San Felipe point protects the port on the north.

Lights: Lat. 36° 37′ N.; long. 6° 22′ W. On the mole at Rota, the north point of entrance to the bay of Cadiz, there is displayed a *flash*-light, the flashes being alternately *red* and *white*.

Lat. 36° 34′ 15″ N.; long. 6° 13′ 56″ W. Near Puerto de Santa Maria, at the entrance to the Guadalete river, there are two leading lights on columns in movable cradles, displayed at an elevation, one of 15 and the other 25 feet. The lights are *fixed red*, and they are visible for 3 miles, illuminating an arc of 62° 15′, or from point Cabazuela to fort Santa Catalina del Puerto. The iron columns and cradles are gray, and serve as leading-marks during the day. A gray house for the light-keepers stands 50 yards from the point, between the two lights.

Lat. 36° 31′ 30′ N.; long. 6° 19 32″ W.

On the western extremity of the redoubt of San Sebastian, on a bed of rocks at the western extremity of Cadiz, stands the white, circular light-tower of San Sebastian, 127 feet high, from which is displayed, at an elevation of 146 feet above the sea, a *fixed white* light, varied by a *red flash* every 2 *minutes*, and visible 20 miles in clear weather.

On the extremity of the mole of Cadiz there is displayed a small *fixed red* light.

Anchorages.

The most frequented anchorage is off the NE. part of the city, from ½ to 1 mile from the mole, according to the ship's draught. Large vessels anchor in the channel a good distance from the city in 4½ fathoms water, mud; coasters near the mole and off the Corrales. The pilots select the anchorage with regard to the business of the ship, and all vessels moor.

The best anchorage in the bay is, undoubtedly, that of Puntales, between the point and Matagorda fort; but, unfortunately, the depth is constantly decreasing, and vessels have, besides, the inconvenience of lying in the channel to the arsenal.

The bearings given for the anchorages are: for a vessel of moderate size in 5 to 6 fathoms water, mud, with the ruined barracks on Leon island tangent to or in line with Matagorda fort and the dome of the cathedral open two or three times its apparent width, E. or W. of the gates of Santo Domingo. For a large ship, the first large building N. of the tower of San Fernando open a little W. of Matagorda fort, and the cathedral open E. of the gates of Santo Domingo.

Vessels having repairs to make, or that are going to make a long stay, particularly if in winter, take a safe position between Puntales and the entrance to the Carraca channel, anchoring E. or SE. of the fort, nearer or farther off according to draught, the depth being from 1½ to 3½ fathoms at low water. This anchorage is perfectly sheltered in all weathers, and in going to it the port regulations require that vessels take a pilot.

In summer vessels occasionally anchor in the roadstead W. of Diamante shoal, or farther NE., in 8 to 10 fathoms, sand and mud, when prevented from entering by contrary wind, or if their stay is to be very short. In winter, if forced to anchor in the roadstead, it should be E. and W. with the principal passage, San Sebastian light bearing SE. by S., and fort Santa Catalina in line with the Morro de Jerez, whence it is easy to enter if bad weather sets in from seaward. Throughout the roadstead there is good holding-ground outside the shoals.

Dangers. The peninsula on which Cadiz is built is surrounded by reefs of jagged rocks that cover at high water. To the westward of the head of the peninsula two chains of reefs extend W., leaving between them a small bight or inlet, called La Galeta, open to NW., where the fishing-boats take shelter from easterly winds. On the southernmost of these reefs are several buildings, the principal one being fort San Sebastian, on the summit of the point of the same name, in which are the light-house and a hermitage. The road connecting the fort with Cadiz at low water is about 3 cables long.

La Olla, a small rocky ledge, is 3½ cables NW. by W. ⅜ W. from the light-house, and has only about 2 feet of water on it at low tide. It is a prolongation of the reef of San Sebastian, as are also the banks of San Sebastian, which extend 1¼ miles SSW. with 2½ to 4½ fathoms water over them. To clear these dangers a berth of 1½ or 2 miles should be given to the light.

The Cochinos are 7 cables NNW. ½ W. from the Bonete bastion, and 2 rocks of the ledge uncover at half tide. They are 1 long mile N. ¾ E. of the light, and are marked by a bell-buoy NNW. of them. This buoy is 1½ miles NW. by W. ⅜ W. from fort Santa Catalina of Cadiz, in 6½ fathoms water.

The Puercas, 5 cables ENE. of the Cochinos, is a ledge with two large rocks that are only covered at high spring-tides. They lie E. and W. with one another, and a beacon tower is to be placed on them.

The Freidera, inside the two latter dangers, and 550 yards

SE. of the Cochinos, is a ledge with about 1 fathom on it at low water.

The Frayle is a little ledge covered by 1 fathom at low springs, lying about 870 yards E. of the Puercas. This and all the preceding dangers may be considered a part or continuation of the Santo Domingo bank.

The Diamante is a rocky bank 1¾ miles N. ¼ W. from Candelaria bastion, and the same distance SW. by W. ½ W. from point Santa Catalina. At this point is the summit of the bank with 2 fathoms on it at low water, the depth on the rest of the bank being from 2½ to 5 fathoms. It is to be marked at its southern extremity by a bell-buoy in 5 fathoms.

The Diamante forms with the Puercas, &c., the principal channel of entrance to Cadiz bay, and the one generally used if the wind permits. It is 8 cables wide, with 4½ to 7 fathoms water on it, bottom of sand, mud, and occasional rocky patches.

The Galera is a shoal 4 cables NE. of the Diamante, the shoalest water on it being 1½ fathoms. From the center of the bank Candelaria point bears S. ¾ W., distant 2 long miles, and point Santa Catalina ENE., distant 1¼ miles. At its northwestern edge there is a *red* buoy in 5 fathoms. Between the Galera and the bank off point Santa Catalina, is the north or Dutch channel, 1 mile wide with 3½ to 7 fathoms in it.

Rota reefs lie outside of the broad reefs and shoals fronting the coast on either side of the point of that name, and are marked by a *red* buoy with *red* ball, moored 1 3/10 miles SE. ½ S. of the point. The shoalest water on these reefs is about 3¼ fathoms. About 1 mile WSW. of Rota, on Duke reef, are two heads with only 1 fathom on them. As already stated, these dangers are cleared by keeping the tower of San Sebastian E. of SE.

Tides. The time of high water, full and change, in the bay of Cadiz, is 1h. 12m.; 1h. 15m. in the channel, and 1h. 24m. at Rota. The rise is 13 feet at spring tides and 4½ feet at neaps At Carraca the time of high water is 2h. 30m., and the greatest rise about 12½ feet. With winds from seaward the rise is greater, and with off-shore winds it is less.

The tidal current follows the direction of the channels. Between the Frayle and the Diamante the velocity of the stream is 1 mile an hour, 1½ miles before reaching the Cabazuela, and 2 miles in the Puntales channel. This velocity increases in the channels beyond and is greatest at high water, at which time in some places, as at the bridge of Suazo, it is 4½ miles. During the ebb the current is inconsiderable.

At Carraca, during the spring, the day tide is greater than that of the night. In winter the contrary is the case, and the tides are higher with a full than a new moon in summer, and *vice versa* in winter.

Winds. The sea-breeze varies between W. and NNW., and is usually stronger at the time of new and full moon, when it frequently blows all night. The land-breeze rarely reaches the anchorage, though it is sensible almost every night nearer the head of the bay. The sea-breeze sets in most commonly with the flood, and is of less strength when the tide makes near noon; indeed, at that period, calms are not uncommon throughout the day.

The SE. and E. winds are most dreaded by the inhabitants, but they are by no means so destructive in their effects as the SW. and W. gales, which send a heavy sea into the bay; whereas the east, being an off-shore wind, seldom creates any swell of consequence. These winds most commonly set in at the full and change of the moon, particularly the former, and blow with great violence. They are seldom known in the winter months, and generally commence in May or June, with intervals of a fortnight or three weeks, and their average duration is 3 days, but at times 5.

The sensation occasioned by these winds is oppressive in the extreme, resembling the heat from a hot iron. The stronger it blows the warmer the wind, and the atmosphere is always impregnated with particles of sand, as in the simoom of the desert. The thermometer rises 10 or 12 degrees in a few minutes after it has set in, averaging from 84° to 92° Fahrenheit, and there is a singular circumstance connected with it, viz, that the temperature between decks on board ship is but little affected.

The inhabitants consider that when the hills of Ronda appear near and distinct, it is a sign of an easterly wind, but there are exceptions to this rule. It may, however, be considered almost a certainty that when the hills have the above appearance, an easterly wind exists in the strait of

Gibraltar. Whenever there is any southing in the wind, the atmosphere is always hazy, and if to the westward of south a dampness ensues, but if to the eastward of south it is hot and dry.

Pilots.

Pilots are usually in their boats on the alert for vessels entering, and hoist a pilot flag as they approach. There is an organized corps of pilots, and some are always on watch at the office of the captain of the port. Their boats are excellent, and they go out in all weathers. The signals from Tavira tower in the center of the city give notice of the approach of ships, but vessels cannot depend on meeting pilots at night. Pilotage is obligatory on large vessels in entering or leaving port and in shifting anchorage.

Leading-marks.

Mention has been made at the commencement of this chapter of the high lands that assist in determining the position of the bay in clear weather, but one of the most remarkable marks, by its height and whiteness, is the town of Medina Sidonia, on the western slope of a conical mountain rising from the middle of a plain, at an elevation of 2,742 feet. It is 18½ miles ESE. ¾ E. from Cadiz, and in clear weather is easily seen above the marshes surrounding Puerto Real and Carraca. South of Medina is a mountain known by the pilots as Morillo de Medina, which serves as a mark for the Diamante.

West of Medina and of the San Fernando road, is an isolated hill 1,370 feet high, named Merrueco Grande. It is of whitish color, is remarkable by its isolation, by the two mounds which form its summit, on one of which is a white building, and it is 13 miles ESE. of Cadiz. Merrueco Chico is a lower hill with a sharper apex, south of the preceding.

To the NE. of Puerto de Santa Maria is a group of low hills rising from a plain, called Cerro de San Christobal. They rise almost perpendicularly, and this steep is named the Morro de Jerez.

In nearing Cadiz, coming from the southward, San Fernando must not be mistaken for Cadiz. The light-house of San Sebastian should prevent any error. From a short distance in the offing Cadiz appears to rise from the sea, an isolated, white mass, and the light-tower looks like a ship under sail, while the tower of Torre Gorda appears isolated and projected on the land. Many fishing-boats are met, when near the bay.

Directions. There are three channels into the bay of Cadiz, known as the main, north, and south channels. In approaching the entrance from the northward, a berth of 2 miles should be given to Candor and Rota points, and from the southward, the coast should not be approached within 2 miles. The shoals are buoyed, and the buoys and broken water clearly define the limits of the channel with wind from seaward, but the buoys are not unfrequently out of position and should not be too much depended upon.

To enter by the principal or main channel bring the Medina and Puerto Real steeples in line, bearing about ESE. ½ E., and keep on this course until the gates of San Domingo are open of the low point of Phillip, which has a flagstaff and a saluting battery on its extremity; or the small mole, called the mole of Seville gate, is open of the point; when the lead will be a sufficient guide, and a convenient anchorage may be taken.

If the weather is too thick to distinguish the above marks, it is better to wait until it clears enough to distinguish the Sbeastian light-tower, north (nearly) of which is the Cochinos buoy. Leaving the buoy to starboard, steer E. to sight the Puercas; give them a good berth, and after passing them 2 or 3 cables, head E. by S., and run on for 1 mile till the mole of the Seville gate is open of point Phillip or until the vessels at the anchorage are seen.

Vessels running up the harbor, after opening San Domingo gates of Phillip point, should steer for Puntales castle, keeping the high tower of San Fernando open of Matagorda, and when abreast San José church a remarkable solitary palm tree will be seen on the summit of Martyr's hill—the first rising land eastward of Torre Gorda, with two magazines on it a short distance apart—which, just touching the south gable end of a large white building at the water's edge near Santibañez mills, leads clear of all shoal water until abreast of fort Luis. The anchorage between Puntales point and the entrance to the Carraca channel is excellent, and needs no other guide than the lead and the chart.

With a beating wind, the Diamante should not be approached nearer than to bring the S. end of Medina on with the N. end of Puerto Real. In standing to the southward, the N. end of Medina should not be brought open southward of the S. end of Puerto Real. It is well to be near the Cochinos when the flood makes, to take advantage of the current setting in.

Vessels entering Cadiz harbor by the north channel, or between the Galera shoal and Santa Catalina castle, should, after passing Rota reefs, steer for Santa Catalina beach until Puerto Real church-steeple is in line with the southern hummock of Merrueco Grande; steer then on this latter course until San Domingo steeple in Cadiz is well open of Phillip point, when the vessel will be within the shoals and can head for the anchorage. Or, after clearing Rota reefs steer for San Sebastian until Santa Catalina castle bears E.; thence steer for Santa Catalina castle until the steeples of San José bear S., when the Galera is passed and the vessel may head for the anchorage. If working in, do not open any part of Merrueco Grande N. or S. of Puerto Real.

The south channel, inside the Cochinos, Freidera, &c., and near the walls of the citadel, is narrow and dangerous, and is only used by small craft and steamers locally familiar.

To enter Cadiz harbor at night requires a very clear night and a smooth sea. With Rota bearing N. and San Sebastian light SE., head ENE., and run on this course until San Sebastian light bears S. by W.; change course to E. ½ S. for fort Santa Catalina, and when that castle bears E. and the light SSW. ½ W., steer S. for the anchorage, being guided by the lights of the shipping, or the *red* light at the end of the mole. It is intended to place leading lights at Puerto Real and other points to guide through the main channel, so that steamers may enter at any time.

With easterly winds vessels leave the bay in the morning and generally wait for the flood. With westerly winds high water is always waited for so as to have an entire tide for doubling the banks. The westerly winds frequently haul landward in the morning, and if at the time the tide is favorable the opportunity should not be lost.

Coast. The coast to the southward of San Sebastian belongs first to the low isthmus between Cadiz and the mainland. It runs 10 miles in a straight line SSE. to the mouth of the Sancti Petri river, and on it are seen the San Fernando road, some few barracks and inns, the faubourg of San

José, a cemetery at the water's edge, the church of San José, remarkable by its height, its whiteness, and its two steeples, the low fort of San Fernando, almost surrounded by water at high tide, and Torre Gorda, rising from the center of a battery on a hummock near the sea-shore, not far from the elbow of the road from Cadiz to San Fernando. Torre Gorda is an isolated white tower, and when the sunlight strikes it, can be seen a long distance. On the battery at its base is a flag-staff, and there is a telegraph on the summit of the tower. South of Torre Gorda, between it and fort Sancti Petri, are a few barren hillocks, whose slopes reach the sea; the largest, the hills of the Martyrs, are about 92 feet high, with several white and easily distinguished buildings on them. One high palm tree stands NW. of the magazine on this hill. The reefs fronting this part of the coast do not extend far out, and usually uncover at low water. On those abreast San José there are fisheries.

Dangers. Coñadura bank is about ¾ of a mile W. by S. from San Fernando fort, with 1 fathom water on it at low tide.

Leon bank is about 2½ miles S. of San Sebastian, and its western edge about the same distance from fort San Fernando. The shallow part of the bank, over a space of about 1 mile, has from 2¼ to 4 fathoms water over it, and there are 11 fathoms at about ½ a mile outside of it.

Martyrs bank lies SSE., nearly, from Leon bank, parallel to the shore, between Torre Gorda and the S. end of Leon island, and about 2¼ miles distant from the coast. It is 3½ miles in length, and has from 3¼ to 5 fathoms water on it. Between it and the Haste Afuera shoal, about 2¼ miles farther to the SSE., there are 5½ to 10 fathoms, and between it and the coast 5 to 10 fathoms, with bottom of rock and sand.

Sancti Petri island, at the southern extremity of the isle of Leon, is a low rocky islet on a reef that uncovers at low spring-tides. On it is the fort of Sancti Petri, which defends the entrance of the river or channel of the same name. The fort is rectangular, with a square tower at one extremity. Inside the islet and to the southward of it are numerous rocks, reefs, and sand-banks.

Sancti Petri river. The river or channel of Sancti Petri, which separates the isle of Leon from the continent, opens between fort Sancti Petri and point Labaculos, a low point prolonged to the

SW. by a reef which almost closes the entrance to the river. The channel is 10 miles long to point Clica, in the bay of Cadiz, where it joins the Carraca channel; it is navigable for small craft through its entire length, and a number of small streams lead from it to little ports, feed many salt-works, and give motive-power to the mills. It is used by the smallest class of vessels only, yet those of 11 to 12 feet draught can enter it at high water, and, as the bar is rocky, the depth does not alter.

Bar. The bar-channel is W. of the rocks and banks already referred to, close to the reef on which the fort is situated, the least depth being between Morena reef and the sand-bank, which connects the reef of the fort with the isle of Leon, where there is only ½ a fathom at low water. After crossing the bar there is more water, and the chief danger to avoid is Pulpera rock, which is marked by a pyramidal iron beacon, 23 feet high. A conical buoy is moored SW. of Albellon bank, in 16½ feet; this, with the Farallon Grande, marks the entrance to the channel. Another conical buoy marks the deepest water (about 3 fathoms) in mid-channel W. of the Piedras reef.

Tides. The establishment on the bar of Sancti Petri is 1h. 20m.; the rise is 11 to 12 feet at springs and 3½ to 4½ feet at neaps. The greatest velocity of the stream in the narrower parts of the river is 2½ to 3 miles an hour.

Directions In making the bar the first point to determine is the fort, which may be known by its whiteness and isolation; on nearing it the Farallon Grande will be seen S. of the fort; pass about 55 yards from the Farallon Grande, between it and Albellon reef, and thence steer for the buoy of the Piedras shoal, leaving it to starboard, close aboard; then head for the Pulpera beacon, leaving it to port, about 110 yards distant, and thence follow the channel, keeping about in mid-channel, where there are 3 to 4½ fathoms, at high water. If the Piedras buoy be not in place, after passing the Farallon Grande, steer directly for the Pulpera beacon, keeping it a little on the starboard bow until near, then keeping up to pass it on the starboard side as above.

The bar should be crossed at the end of the ebb, at slack water, never with the flood unless the wind be strong enough to keep good steerage-way. With any swell, the sea breaks on all the reefs, and the entrance appears entirely closed, in which case all possible sail should be carried and the greatest precautions taken.

The Chiclana channel, opening about 5 miles from the bar of the Sancti Petri, leads to the southeastward to the town of Chiclana de la Frontera, 2 miles E. of the river at the base of mount Santa Anna, and on the mountain is the church, which, as well as the town, is visible a considerable distance. Population about 9,000.

At ½ a mile before arriving at the Suazo bridge, which is so low that boats have to lower their masts before passing under it, the Zaporito channel opens. This is the port of San Fernando, and in it are commodious quays for discharging freight. Only a light-draught vessel can go so high, and as the Sancti Petri is gradually filling up, it will soon lose any commercial importance it now possesses.

Coast. South of the Sancti Petri the coast trends SSE. for 15 miles to cape Trafalgar. The first remarkable object on the coast is the Bermeja tower, about 1¼ miles SE. of the entrance to the Sancti Petri, a round tower on a reddish bluff, flat-topped, and a little higher than the surrounding country. This bluff is covered with fir-trees, being part of the Barrosa wood, which commences here and extends eastward and northward. North of the tower is a house, named Coto, belonging to the coast guards, and the Levante reef borders the coast at the foot of the tower and extends 6 cables to the SW. Thence to cape Roche, distant 5½ miles, the coast is clean; on it is seen the Barrosa house, off which coasters find good shelter from easterly winds, and 2 miles S. of Barrosa, the Puerca tower. The Barrosa house is a large, white building, used for salting fish, stowing nets, &c., and the Puerca tower is a round ruin on a sandy hummock on the sea-shore at the foot of Puerca hill, which is low, and extends NE. and SW.

Shoals. But off this coast at a distance of 1 to 3½ miles lies a dangerous chain of shoals; the northernmost is 3 miles from NNW. to SSE., with 1½ to 4¾ fathoms water on it, the northern hummock of the shoal being the Hasta Afuera already mentioned, with 1½ fathoms on it and 3½ to 5 fathoms close around. The sea breaks here with the least swell.

The Mogote, the southern summit of the shoal, is 1 mile S. by E. from the preceding, with at least 3¼ fathoms water on it at low tide. Between this long shoal and the coast is a channel 3 miles wide with a depth of 6 to 7 fathoms, sand and rock, in which are patches in 3¾ to 4¾ fathoms water. It is intended to mark the western edge of the shoal by a bell-buoy.

The Marrajos shoal, in 2¼ to 3 fathoms water, is 1 mile long NW. and SE., and from the northern head the Puerca tower bears ENE., distant 2 miles; from the southeastern head the same tower bears NE. ¾ N., distant 2 miles. The soundings of 3¾ to 5 fathoms continue until near the cape Roche shoal, with which a channel is formed carrying 7 to 8 fathoms, the same depth being found between the shoals and the coast.

Cape Roche shoal is a rocky shoal 1½ miles long from NW. by W. to SE. by E., cut in two by a channel 1 cable wide with a depth of 7 fathoms. There are 2¾ to 4½ fathoms on the shoal, and 6 to 7 fathoms in the channel ½ a mile wide, between it and the cape. The northern summit of the shoal is 1 mile SW. by W. ¾ W. from the tower on the cape, and the southern 7 cables S. by E. from the same point. In passing between the shoal and the coast a berth of 2 cables must be given the cape on account of the rocks off it, and this passage is used only by coasters and larger Spanish vessels that are familiar with it. If in case of necessity, however, the channel inside the preceding dangers be used, the vessel's position should be constantly checked, the lead kept going, and the tide considered. In keeping outside them, vessels of heavy draught should not stand nearer than about 4 miles, or into less than 15 fathoms water during fine weather, and 6 or 7 miles when there is any sea or unsettled weather; and in leaving Cadiz a vessel should not steer to the southward until Rota bears E. of N. by E.

Cape Roche.

Cape Roche, about 5½ miles SSE. from the Bermeja tower, is somewhat low, steep, and of a red color, and has a square tower on it. From Bermeja, the land gradually rises to the height of the cape, but the shore all along is a flat beach to 1¼ miles N. of it, whence commence the cliffs of Castillejos. On the east side of the cape the little river of the same name runs into the sea.

From the cape the coast trends easterly and SSE. to the tower of Atalaya de Conil, and thence SSE. 5½ miles to cape Trafalgar. Between the cape and the Atalaya tower is comprised the bay of cape Roche, with a clean, safe bottom, and surrounded by steep bluffs with small beaches at their base. Near the shore and perpendicular to the beach are 3 black rocks, named Tres Piedras de Cala Roche. The square Atalaya tower is 1 cable W. of Conil on a low bluff.

Conil. This town, with about 7,000 inhabitants, stands on rising ground, 2¾ miles ESE. of cape Roche; its church steeple is conspicuous, and on a hill to the eastward are several windmills, and on its south is the little river of the same name, which admits small craft at high water, but they lie dry when the tide is out. A long, safe beach extends from Atalaya tower to the tower of Castilobo, and off it is a good anchorage in easterly winds, but it is not advisable to anchor in unsettled weather, on account of the difficulty of clearing cape Roche and the adjacent shoals, should wind from seaward set in.

Castilobo tower. To the southward of Conil is the square, stone-colored tower of Castilobo, now in ruins, and not easily recognized on that account. Farther southward is Torrenueva or Blanca tower, round, white, in good repair, and occupied by the customs department. Between these two the shore line is a low beach with a few huts on it and a brook, backed a little inland by hills varying from 300 to 650 feet high. These are named the Patria mountains and are conspicuous from the westward.

Cape Trafalgar. Cape Trafalgar is a low, steep, sandy point with a tower and a light-house on it, and being separated from the high land to the northward by a low sandy plain, appears, at a short distance from the NW. or SE., like an island.

Conil banks. Between Conil and cape Trafalgar, at about 1¾ miles from the shore, are two rocky shoals called the Little and Great Conil, on which the water breaks when there is any sea. They lie parallel to the coast, with irregular depths on them of from 1½ to 4¾ fathoms, and the two together extend over 2¼ miles. The Little Conil, on the north, is separated from the Great Conil by a passage ¼ of a mile wide, with 9 fathoms water. From the north extreme of these shoals the tower of Atalaya de Conil bears N. by E. ¾ E., distant $2\frac{1}{10}$ miles, and Castilobo tower ENE. ¾ E., distant 1½ miles; and from the south extreme Blanca tower NE. ½ E., 1¾ miles, and cape Trafalgar light-house, ESE. $\frac{1}{4}$ E., $3\frac{6}{10}$ miles.

Light: Lat. 36° 10′ 45″ N.; long. 6° 2′ 14″ W.

On the summit of cape Trafalgar there is a slightly conical tower 116 feet high, which displays at an elevation of 168 feet, a *white* light *revolving* every 30 *seconds* and visible 19 miles in clear weather. The dome of the tower is conical and painted in alternate sections of red and yellow, and the tower itself adjoins the keeper's dwelling, the group forming a good landmark. In a SW. gale the spray dashes over the tower and diminishes the visibility of the light.

Meca plateau.

High table-land, divided in two, rises abruptly to the eastward of cape Trafalgar at a short distance from it, and extends to the hills of Patria, which reach an elevation of 625 feet at $3\frac{1}{2}$ miles eastward of Conil. This table-land, extending NNE. and SSW., bears the name of the Altos de Meca, which, in connection with a white round tower on the western part, called Torre de Meca, forms the most remarkable land on the Spanish coast westward of Gibraltar.

The site on which the tower stands, in whatever direction it may be seen from seaward, presents almost always the same appearance. Its color is dark, and on its northern part there are some sandy patches which contrast well with the green hue of the surrounding land. From the tower of Meca the table-land trends in the direction of the tower of Taja, declining gently on approaching the sea, where it terminates abruptly in a steep cliff, the whiteness of which is remarkable.

Vejer.

The table-land formed by the Altos de Meca extends also to the north for some distance, and preserves its height as far as the town of Vejer, which contains about 8,000 inhabitants, and stands on a hill $5\frac{1}{2}$ miles NE. $\frac{1}{2}$ N. from cape Trafalgar. This town, visible from Barbate bay, is hidden from westward of the cape by the heights of Meca and Patria, but then there are several windmills seen on a hill 725 feet high, a short distance west of the town.

Shoals.

The Aceytera bank is a dangerous rocky shoal, on the west side of cape Trafalgar, a mile in length NNW. and SSE., having from about 3 to 20 feet water on it, and on which many vessels have been wrecked. From the NW. extreme of the bank cape Trafalgar light-tower is on with the Boqueron, (a sandy patch between the cape and Taja tower,) bearing E. by N., $1\frac{3}{5}$ miles distant, and from a depth of 5 fathoms, on its south extreme the light-house bears about NE. ½ N., 2 miles.

The south end of the Aceytera is connected with cape Trafalgar by a rocky ridge about ¾ of a mile wide, over which the general depths are from 2½ to 5 fathoms; but there are two shallow patches, one called the Requin, with 1½ fathoms water on it at 1¼ miles from the light-house, and the other the Animas, with 1 fathom on it at ½ a mile from the light-house. None but small vessels, and under favorable circumstances, should therefore pass between the Aceytera and the cape, as over the rocky ridge there is a race about half a mile in extent, which occasionally breaks, caused by the unevenness of the ground and the effect of counter-currents. This race extends to SW. and WSW. sometimes, over the banks, and when combined with a heavy sea is very dangerous, so that a wide berth should be given the shoals.

The Meca is a rocky shoal covered with a slight layer of sand, which extends nearly 2 miles NW. and SE., with from 2½ to 5 fathoms water on it, and on which the water breaks when there is any sea. It lies about 3 miles WNW. ½ W. from the cape, and from its NW. extreme the light-house and Taja tower are in line; and from the SE. end the light-house is on with the Boqueron. A bell-buoy is to be moored a little west of its NW. extreme.

The Phare is a rocky bank to the SSW. of the Meca, with from 7 to 10 fathoms water on it. It is 5 miles SW. by W. ¾ W. from the light-house.

And finally, the Little Phare, a 9-fathom patch, lies 15 miles WSW. of the cape, and in heavy weather it must be avoided, as the sea breaks on it with great violence.

Anchorages. Coasting-vessels anchor in 5½ to 6½ fathoms water, near the shore, off the beaches between cape Trafalgar and Torrenueva, (Blanca tower,) for shelter during easterly winds; but when the wind is from N. or NW. it is safer to anchor east of the cape off the beach of Baradero de Meca, a little cove which affords convenient landing, where the holding-ground is good. This anchorage is in 9 to 11 fathoms, and affords shelter from NW. and also W. winds.

CHAPTER X.

WINDS, CURRENTS, AND NAVIGATION OF THE GULF OF CADIZ.

Gulf of Cadiz. The gulf of Cadiz is the large bay comprised between the S. coast of Portugal, the SW. coast of Spain, and a part of the coast of Morocco, the limiting points being cape St. Vincent and cape Mazagan, the latter bearing S. ½ E. from the former, distant 230 miles. This gulf would be very dangerous with SW. winds, to which it is entirely open, were it not for the strait of Gibraltar at its extremity and the bay of Cadiz a little farther to the northward.

The coasts are generally low and regular, except near the strait of Gibraltar and about cape St. Vincent, and to a great extent are fringed by reefs that would be often very difficult to clear in a gale from seaward if the power to enter the strait did not relieve a vessel from the necessity of working off shore. It is also an advantage that the whitish color of the water and the regular decrease in the soundings give notice of proximity to the land when thick weather, darkness, or fog prevents it being seen. The 100-fathom line passes about 15 to 20 miles from the coasts of Spain and Portugal and a like distance from the coast of Africa.

Winds. The prevailing winds in the gulf of Cadiz, and particularly near the strait of Gibraltar, are from the E. and W., while on the coasts of Portugal and Galicia they are from N. and S.

The easterly winds, (*levanters**) which in the Mediterranean are usually accompanied by thick, dirty weather and rain, accumulating heavy clouds on the mountain peaks at the eastern entrance of the strait, are very dry and clear on the coasts of Cadiz, Huelva, and Algarve, as if, in crossing the mountains of Algesiras, they had deposited all their moisture on the chain separating the high from the low lands.

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* On the south coast of the Iberian peninsula all easterly winds between the points of ENE. and ESE. are called *levanters,* and westerly winds between the corresponding points are termed *ponientes.*

The force with which the *levanter* enters the strait augments until the meridian of Tarifa is reached, then diminishes in nearing cape Trafalgar, and usually is unfelt at Cadiz; but when a strong east wind blows at Cadiz it is almost always well established on the parallel of the strait to a greater distance from the western entrance.

When, also, a fresh east wind is blowing in the strait, the *virazons* or sea-breezes blow at Cadiz and in the gulf of Huelva, the limit separating the two winds being almost always cape Trafalgar; so it often happens, and particularly in summer, that a vessel will pass through the strait with a strong east wind and enter Cadiz with a fresh sea-breeze; in which case the easterly wind holds until near the meridian of Tarifa, or even as far W. as Trafalgar, when, diminishing in force, it hauls gradually to SE. and S., to steady finally at SW. or WSW. When this can be anticipated, a good offing should be kept to avoid delay and difficulty in rounding cape Trafalgar.

Sometimes the east winds take 2 or 3 days to reach Cadiz, and occasionally do not reach there at all, though blowing fresh in the strait. So, also, at times they blow at Chiclana and Carraca without attaining the entrance of the bay, where the sea-breeze is felt; but in this latter case they are soon established along the coast to cape St. Mary, and even farther west. Sometimes they do not pass the entrance of the Guadalquivir.

Even when the east wind comes in as above it is at first intermittent, commencing with short squalls of greater or less force, as if struggling with the west wind which opposes it, and it is felt in squalls by vessels coming from the strait to cape St. Vincent, until it is constant and thoroughly established. Along the coast of Cadiz, between Trafalgar and the Guadalquivir, the squalls give place to a steady wind, particularly in summer, which sometimes lasts fifteen days, only interrupted by calms toward sunset and a light breeze during the night until daylight, then increasing until sunrise; then, after a few heavy squalls, a gradual increase in force is felt until noon, when it is strongest. In occasional years two months will sometimes pass without an easterly gale.

This east wind is undoubtedly the worst in the gulf of Cadiz, and as it blows at times for a week or a fortnight, it almost entirely interrupts commercial opperations at the eastern ports, as few vessels can be under way during the day, but only at night or in the early morning. At the latter period it sometimes hauls to NE. in Cadiz bay, but after sunrise returns to the E., and after 10 o'clock boats can rarely be used.

Chief characteristics of the *levanter.*

As already stated, from the meridian of Tarifa, westward, the easterly winds are clear and dry, particularly in summer, and when they blow at this season the suffocating heat and fine dust accompanying them oblige the inhabitants of Cadiz and its environs to close their houses hermetically. As the wind traverses the country it burns the crops and is injurious to health. The sky is clear, but a haze rests about the horizon and over the land. If any clouds are seen, they are *cirri*, very light and high. At sunrise and sunset the sun is pale, as if seen through a haze, and can be looked at with the naked eye.

The wind that comes slowly and gradually, taking 2 or 3 days in its passage from the strait to Cadiz, is the most tenacious, and that which comes suddenly and with force is soonest over. In winter the east winds are less frequent and blow clear until they haul to the SE., when the sky quickly covers with thick clouds, bringing rain-squalls, indicating a certain shift to the S. and then SW.

Indications.

The complete absence of dew, and the peculiar dryness of all exposed objects on a ship's deck, sometimes accompanied by the cobweb-like "Virgin's threads" on the rigging, are sure indications of a *levanter.*

In the bay of Cadiz, when small white clouds like broken cotton-bales are seen hanging about the peaks of Ubrique and the mountains of Algesiras, it is an indication that the east wind is blowing in the strait of Gibraltar, and if this sign be accompanied by the peculiar heat and dryness of the *levanter*, it will soon enter the bay of Cadiz, though at the time the westerly breeze may be blowing.

In the gulf of Huelva it is known when the *levanter* blows at Cadiz and in the strait, by the paleness of the sun at sunrise and the haze over the land.

Another indication is given when the sea-breeze commences to diminish in force, and when about nightfall it hauls to northeastward, with a few isolated clouds in the sky. And an unusual clearness of the atmosphere, allowing the most distant mountains to be easily seen, shows the approach of the east wind, while as soon as their summits become hazy the wind will haul to SE.

A slight fall of the barometer and a simultaneous and sudden rise of the thermometer show the approach of this wind, but as soon as it is established the barometer rises. If, after several days of the *levanter*, there is a further rise of the barometer, the wind will soon cease, no matter how strongly it may be blowing, and be replaced by the west wind.

West winds. The west winds, fresh and healthy, alternate with the east winds, and so blow in all seasons of the year. They are opposite in character as in direction, being generally moist and cloudy. They never blow as hard as the *levanters* nor so long, and they usually are lighter toward sunset.

When, during the winter, these winds hold to the SW. the sky is overcast, and squalls of rain and wind hide the coast, but between the squalls the weather is sufficiently clear to make out the land. If these winds hold from the NW. they are clearer and may last 8 or 10 days.

Indications. The appearance of dew on the deck, &c., announces the approach of the west wind though the east may be blowing.

Generally, before the west wind is established, the east wind moderates and hauls through SE. to S. and SW., while the barometer falls. In winter, thick clouds, and rain that becomes almost constant, accompany this change, and at SW. the barometer is lowest. Then, if the barometer shows a tendency to rise, and the squalls become less frequent, a rapid change to W. may be expected.

The *vendavales* or SW. gales have been described in Chapter I.

Prevalence of each wind. According to the official journal kept in Tavira tower, the number of days of each wind at Cadiz for five years, (1856–'60,) was as follows:

Days of north wind....	34	Days of wind from N. to E.	471
Days of south wind....	63	Days of wind from E. to S.	184
Days of east wind.....	297	Days of wind from S. to W.	512
Days of west wind.....	133	Days of wind from W. to N.	568

Days of wind from ENE. to ESE., or east winds	373
Days of wind from WSW. to WNW., or west winds....	455

The older sailors of the bay of Cadiz and its environs say that the climate of this part of the globe has changed within the space of a few years, the change extending even to the wind and tempests. They state that storms are rarer now than formerly, when the bad weather commenced in September and lasted until spring, heavy gales succeeding one another almost without intermission. It appears that now the tempests commence to moderate almost as soon as they are well established, so that they are of shorter duration. The wind also is more variable both in summer and in winter, and it is rare that the same wind blows fifteen consecutive days, as it was said to do formerly.

Storms rarely originate on the coast of Cadiz, but come from other regions at a greater or less distance, and the bad weather almost always commences when the wind is at SE.

Sea and land breezes.

These local winds are frequent during the summer in the gulf of Cadiz. The sea-breeze common to southern and deeply-indented coasts blows at Cadiz during the dry season, whenever the east wind is not violent, and it is stronger and more lasting in the gulf of Huelva.

The sea-breeze sets in toward 9 or 10 o'clock in the morning from the S., freshens gradually, hauling to SSW. and SW. as the sun nears the meridian, attains its greatest strength in the afternoon, during the heat of the day; diminishes as the sun goes down, hauling to W., and falls calm at 8 or 9 o'clock p. m. After 2 or 3 hours of calm the land-breeze commences, gathering strength as the night grows colder; it is strongest in the early morning, diminishes in force toward sunrise, and ceases as the earth grows warm.

The land-breeze blows from NE. in the gulf of Huelva, from ENE. in the bay of Cadiz, and from ESE. on the coast of Africa. When the land-breeze is from the E. in the bay of Cadiz a *levanter* is blowing in the strait of Gibraltar. As long as the regular sea-breeze blows, commencing at SE., to finish at NW., vessels are in perfect security along the coast, and can even anchor if desirable.

Off the coast of Cadiz the sea-breeze is not so permanent as in the gulf of Huelva, where the east wind does not occur so frequently. Though the dry season is really the season of these local breezes, they often occur in winter also during a continuance of fine weather.

Currents.

There are two general currents in the gulf of Cadiz, setting from S. to N. and from N. to S., inclining to E. or W., according to the direction of the wind blowing or about to blow.

Near the western entrance of the strait of Gibraltar, and in the strait only, there is observable a constant current setting E., due to a slight difference of level between the Mediterranean and the Atlantic; this difference of level is attributable to the loss produced by the excessive evaporation in the former sea, and this loss is replaced by the waters of the Atlantic. Sometimes this current is scarcely perceptible unless in the narrower parts of the strait.

With violent *vendavales* a northerly current is produced, which follows the contour of the coasts of the gulf, setting to NE. on the coast of Africa, N. and NNW. on the coast of Cadiz, NW. and W. in the gulf of Huelva and on the coast of Algarve; it then doubles cape St. Vincent, and, joining the general current, follows the contour of the coasts of Portugal and Galicia, doubles capes Finisterre and Prior, and crossing the bay of Biscay, enters the British and St. George's channels, and is lost in the North sea. It has been observed that in these storms there are strong currents in the above channels, and an increase in the tidal rise in their ports and harbors. In the middle of the gulf of Cadiz at such times the general set of the current is NE.

The current just described produces a very sensible effect along the coast of the gulf of Cadiz by the elevation of the ordinary level of the sea. Thus, in the bays, ports, and rivers, the tide rises 1½ to 2½ feet higher than usual, and the hour of high tide is retarded.

Vessels from the strait bound for cape St. Vincent and *vice versa*, with southerly winds, and often the coasting steamers in like cases, are drifted into the gulf of Huelva; experience teaches that vessels leaving the above points, and Cadiz, should keep a good offing and make full allowance for current to avoid this danger. Vessels obliged to remain out of port during a *vendaval* should place no confidence in the reckoning, and should carry as much sail as possible, keeping close enough to the wind to compensate for the drift, endeavoring to keep on the parallel of the strait, for without every precaution is taken, it is almost impossible to avoid being drifted into the gulf of Huelva and wrecked on the Arenas Gordas.

The velocity of the currents in the gulf of Cadiz during the *vendavales* is estimated at about 2 miles an hour between capes St. Vincent and Trafalgar, and during these storms it is very unwise to attempt to lay-to for any length of time in this portion of the gulf. It is better to enter Cadiz bay if possible, or to remain off the entrance of the strait to secure a retreat if necessary.

In ordinary weather the currents of the gulf are slight and set in the direction the wind is blowing. Close along the coast the tidal current only is felt.

Fogs.

In the gulf of Cadiz, and especially at the entrance to the strait of Gibraltar, fogs are dense and long lasting. At the latter point they collect when the east wind ceases, forming a kind of curtain across the entrance, and advance gradually eastward until every part is completely covered, and only disappear when the west wind is well established.

On the coast of Africa the fog forms in the morning and disappears at noon or a little later, during the season of the NE. winds. Sometimes it remains off the land until nightfall, when it advances to the coast and covers everything.

The fog lies frequently close to the surface of the water, so that often the sails of a ship may be seen over the bank, and fortunately the thick fogs only form during a calm, so that much danger of collision is avoided. As, however, counter-currents and rips frequently drift the vessels near one another, and as there are always many ships *en route* near the strait, the fog-horn, bell, or whistle should be used constantly, and steamers should stop or greatly reduce their speed.

Making the land.

The three most remarkable points on the coast under consideration are cape Spartel, cape St. Vincent, and cape Villano or Finisterre. Vessels bound for the Mediterranean always sight the former, as well as vessels that, coming from America on a parallel south of 36°, have been prevented by northerly winds from making cape St. Vincent; while those from the westward and north make cape St. Vincent, whether they are bound for Cadiz or the Mediterranean. Those vessels from the northern ports of Europe make cape Villano, no matter what ports south of it they are bound for.

Vessels entering the strait of Gibraltar should prefer to make cape Spartel rather than Trafalgar, the former being safe, high, and remarkable, while the latter is low and surrounded by dangers; and especially should this preference be shown if the reckoning and observations have not been perfectly satisfactory. But in going to the Mediterranean with winds from N. to E., if capes St. Vincent, St. Mary, &c., have been sighted, cape Trafalgar should be preferred, as it is then probable that a *levanter* is blowing in the strait, and it is well to keep under the Spanish coast.

Cape St. Vincent is an excellent point to make, because it is remarkable and safe, and being very projecting, vessels are not inconvenienced by getting close under the coast. Its position, also, is well marked by the Monchique range, which can be seen a long distance. In time of war this point should be avoided, as it is the cruising ground of the Spanish privateers and war-vessels.

Cape Villano is preferable to cape Finisterre, as it is high, and projects to the NW., and it is adopted by vessels from the British channel and St. George's channel. They usually avoid making cape Prior, so as not to risk being embayed by the wind, sea, or currents along the NW. front of the Iberian peninsula. Cape Villano is seen before cape Toriñana, because it is more remarkable and higher, though it is not so projecting as the latter.

All these points, so favorable for land-falls, are provided with excellent lights, so that they may be approached without danger during the night.

Going to Cadiz. A vessel from America bound for Cadiz, not having been able to make cape St. Vincent, can, if sure of the position, hold on into the bay and make the high mountains of San Christobal and Ubrique, which are visible a long distance from seaward. The former, known to the sailors as the Cabeza del Moro, is 5,756 feet high, and can be seen 25 to 30 miles at sea and W. of it. So Cadiz may be made directly by vessels from the Canaries or the coast of Africa if the position is well determined and the wind favorable; but if the wind is between S. and E., which announces a *levanter* in the strait, it is better to make cape Spartel and take a departure from there. At night the lights of this cape and Trafalgar facilitate taking a proper course for the bay.

Sometimes the high lands of the interior are obscured by the haze, in which case Beva hill and the neighboring lands of San Lucar will be first made. If the vessel is a little N. of the parallel of Beva, Regla convent, Chipiona, and other buildings on the coast will soon be seen. Their perfect whiteness makes them distinguishable even through the fog, as a rule, but if they too are hidden, the color of the sea and the lead will indicate the approach to land, and to some extent the position. If the bottom is pure sand, the vessel is between S. and WSW. of Cadiz, 4 or 5 leagues distant, and if the bottom is soft black mud, she is on the parallel of the bay; pure sand or sand and gravel is met from the parallel of Cadiz to the strait, while mud, more or less soft, is found between the same parallel and the mouth of the Gaudiana.

Coasting-steamers and other vessels familiar with the coast, where the draught is not too great, pass inshore of the Aceytera and Conil banks, when bound from the strait for Cadiz with the east wind blowing fresh, thus shortening the distance and gaining some shelter from the *levanter*.

If not familiar with the inside channel, and it is desired to keep the shelter of the coast, an offing of about 4 miles should be preserved, and when Cadiz light-tower bears N. by E. head N., keeping the tower on the starboard bow, and pass as close as possible to the reefs of point San Sebastian, so as to be well to windward for the first board northward in the bay.

Sailing-vessels should not enter Cadiz bay against the ebb, if working in, but should so regulate their speed between cape Roche and Cadiz as to reach the entrance about the time the flood makes; the best working ships have great difficulty in beating through the channels against the ebb, even at neap tides.

The inside channels north of Trafalgar should never be attempted when the sea is rough; on the contrary, a berth of 5 miles should be given to the cape to avoid the race which sets over the banks, and a good offing kept until the San Sebastian reefs are neared.

Vessels having passed inside Aceytera bank can take the open sea again between Meca shoal and Conil banks, or between the latter and cape Roche shoal, in which case good bearings should be taken and the course carefully laid, remembering that the set of the flood is to the NW.

A strong ground-swell announces a heavy sea in these channels, which should then be avoided. At such times the sea breaks over most of the banks.

In going from the strait to Cadiz, if, when on the meridian of cape Plata, the *levanter* blows with less force, and it is observed that the W. wind is blowing in the ocean, a vessel should pass 10 or 12 miles S. of Trafalgar to take advantage of it.

In winter it often happens that a fresh east wind is blowing at the eastern entrance of the strait and a *vendaval* west of it; therefore, if on reaching the meridian of Tarifa the *levanter* hauls to the SE., a vessel should keep along the African coast, because, as she nears cape Spartel, the wind will certainly haul to S. and SW., and a good offing is necessary in order to double the capes and banks and make Cadiz.

The same observations apply to vessels from the strait bound for San Lucar or Huelva; and with all vessels passing between these points, and as far as cape St. Vincent, it is important, during SW. winds, to lay the course with great care so as to counterbalance the effect of the dangerous currents that set to the coast; while with off-shore winds, from N. to E., the coast should be neared, as the currents then set to seaward.

From Cadiz to the strait.

Vessels from Cadiz or ports farther west bound for the strait of Gibraltar, with easterly winds, should work along as close to the coast as possible to avoid the heavy sea, until abreast cape Plata, when, unless the sea is too high to allow it, they should run as far as the middle of the strait before tacking, so as to profit by the greatest strength of the general current.

If, on arriving at cape Trafalgar, it is perceived that the wind in the strait is too strong to work against, it is better to cross under easy sail and take temporary shelter under cape Spartel. There is no inconvenience experienced if the vessel fall 5 or 6 miles to leeward of this cape, because, after passing out of the heavy sea, she can luff and make Jeremias anchorage, and lie there under sail until the East wind moderates.

From Cadiz, &c., to the strait, the navigation presents no difficulties with the west winds, care only being taken to clear well the reefs and banks. With a heavy sea, the first course from Cadiz should be S. by W. or SSW., gradually hauling to S. and SE. as Trafalgar is approached.

In making these passages at night, the lights of San Sebastian, Trafalgar, and Spartel allow bearings by which the course may be laid and checked, for one light is made before the other is lost, and their character is so distinctive that no mistake can be made.

General observations.

A vessel from the west for Cadiz, if met by strong easterly winds on the meridian of cape St. Mary, should tack between the parallel of Cadiz and the coast of Huelva, because nearer the parallel of the strait the wind is stronger and the sea higher.

Coasting-vessels from Ayamonte or Huelva for Cadiz, and from the latter place to the strait of Gibraltar, usually anchor when the east winds blow strong against them. They remain at anchor under the lee of any of the beaches along the coast, and take advantage of the night, when the wind generally moderates and hauls toward the NE. The ebb also, during spring tides, is an assistance in working against the wind.

One of the greatest difficulties experienced by a vessel bound to Cadiz, is when a *vendaval* is encountered, accompanied by rain that completely hides the land. In this case, if the ship's position is not exactly determined, an endeavor should be made to reach the parallel of the strait. If the gale strikes the ship when on the parallel of Cadiz and the meridian of Ayamonte or Huelva, all sail possible must be carried to counterbalance the effect of the currents and to work out of so dangerous a position. As the coasts of the gulf of Huelva and Cadiz are low, they are not easily distinguished, and the lead must be constantly used. The 100-fathom line passes more than 20 miles from the shore.

CHAPTER XI.

THE IBERIAN PENINSULA.

Geographical position and formation—Commercial importance —Imports, exports, manufactures, &c.

Spain and Portugal, forming the Pyrenean or Iberian peninsula form the SW. extremity of the continent of Europe. The peninsula extends 540 miles N. and S., and 620 miles E. and W., and on the NE. it is connected with the rest of Europe by an isthmus about 240 miles wide. On all other sides it is surrounded by water, viz: On the E., SE., and S. by the Mediterranean and the strait of Gibraltar; on the SW. and W. by the Atlantic, and on the N. by the bay of Biscay.

Physical geography.

A slight glance at the physical geography of the peninsula will explain how it comes that while some writers speak in raptures of the grand mountain scenery and the richness and verdure of the plains and valleys, others seem to have had no experience but of the "tawny Spain," a vast Sahara of bare, burnt-up steppes. A look at the map will show that the framework or skeleton on which the mass of the peninsula hangs, is a T-shaped structure, the horizontal part being the Pyrenees and their continuation, the long range that under various names runs parallel to the bay of Biscay, and terminates in the NW. corner, in Galicia; the stem of the letter being represented by an irregular mountain chain, which branches off from the other a little beyond the point where the Pyrenees proper end, and, with many bends, but on the whole a due south direction, runs down to the Mediterranean. This latter is the backbone of Spain and the watershed of the streams that flow into the Atlantic on one side and into the Mediterranean on the other. Near the junction of Old Castile, Navarre, and Arragon, in the Moncayo, it rises to a height of about 9,000 feet, while in some parts not more than a third of that elevation is attained. It is, moreover, rather a central ridge than a mountain range rising above the surface of the country, for, in many places on the eastern side and most on the western, the ground slopes away with a gentle declivity, so that looked at from above, the peninsula would appear somewhat like a roof, or an open book lying face downward on a table. It will also be observed that the ridge divides the peninsula into two very unequal portions; that while on the western side the Atlantic coast descends in a line parallel with the ridge, on the eastern the Mediterranean coast line inclines inward toward it, and meets it at the south-eastern angle, at the Cabo de Gata. Thus there is a square on the left-hand side of the T, and a triangle on the right; consequently the declivity on the right, or east, side is greater toward the lower angle of the triangle than that on the other side, and the warm winds and clouds coming from the Mediterranean are soon intercepted, and as they rise to cross the barrier are robbed of their moisture, which falls back toward the coast. Hence it is in this angle that we find the garden of Spain, that luxuriant strip of country that extends from Murcia up to Catalonia, in vegetation the richest and most varied tract in Europe, where everything seems to flourish, plants and fruits of both the temperate and torrid zones.

To this strip may be added what, in reality, is its continuation—the narrow border running westward to Malaga; for though, for clearness sake, it has been stated that the stem of the T ends at Cabo de Gata, it in truth bends to the left and finishes with the lordly Sierra Nevada, the Ronde mountains, and Gibraltar.

With the other, the western, side of the ridge the case is very different. There the winds from the Mediterranean arrive desiccated in their ascent; while those which come from the Atlantic have to travel some hundreds of miles up hill, shedding their moisture as they go. Portugal takes heavy toll of them as they pass, and consequently Spain is left high and dry. There is, therefore, stretching across the peninsula nearly from N. to S., a broad belt of the most rainless country in Europe, except perhaps some parts of Russia. Nature having done so much, man has lent a helping hand. The Spaniard's carelessness and even dislike of trees has denuded the mountain-sides of the forests, which once covered them more or less completely. There are no sponges to retain, no reservoirs to catch and gradually distribute such rain as does fall, and it can only roll off the pent-house roof by those great natural gutters, the Douro, the Tagus, the Guadiana, and the Guadalquivir. These rivers themselves indeed tell the story plainly enough; they suggest a life alternating between drought and flood; for the most part either wandering over vast expanses of gravel, or else rolling along between steep, high banks, in deep troughs cut by the force of rushing waters. So it comes that, while on the one side there is a rich, moist country teeming with vegetable life in every form, on the other there is a country, not indeed barren, for it yields corn, wine, and oil in abundance, but parched and bare to the eye, with little vegetation except wheat, vines, and olives—a dry and stripped country. It is scarcely an exaggeration to say that a traveler crossing the middle of the peninsula from north to south might count the trees he will pass between the Bidassoa and the bay of Cadiz; or at least from the moment when, issuing from the Pyrenean defiles, he leaves behind the green woody Basque country and enters upon the genuine tawny Spain by the plain of Vittoria, until, approaching the sea, he comes within sight of the hills of Jerez.

Of the secondary mountain chains there are four, branching off from the central stem in a westerly or southwesterly direction, and dividing the slope into as many compartments. Like the central ridge, in many places the slope is very gradual, and in crossing them even at great elevations their height relatively to the plain out of which they rise is not great.

The narrow strip of country lying along the shore of the bay of Biscay, and made up of the Basque provinces, Santander, the Asturias, and Galicia, is in some degree the complement of that other strip above mentioned, stretching along the Mediterranean coast, and the same causes have produced the same effects, the difference being that due to difference of latitude, and of Atlantic and Mediterranean influences.

There is great inequality in the soil of Portugal, but much of the land is exceedingly fertile and well adapted to the growth of all the productions of the temperate zone. The vegetation does not differ materially from that of the rest of the peninsula, but the mountain scenery is much finer, as the peaks are more distinct as the ranges advance to the west.

Geological formation.

The geological formations of the peninsula range with the mountains E. and W., and consist in the mountains themselves, of metamorphic granites and crystalline schists, and on their flanks are represented the Silurian, Devonian, and sometimes the Carboniferous formations. The E. part of Tras os Montes, however, consists of slates. The older paleozoic rocks are frequently covered by groups of the Tertiary, some of the most recent of which, as along the southern slopes of the Guadarrama, lie inclined from the uplifting of the mountains, while back from the mountains the same strata lie horizontally. Many of the mountains in the eastern provinces are Jurassic or Cretaceous rocks, and the rock of Gibraltar is of jurassic limestone. The trias also is traced from the Pyrenees to Andalusia in beds of conglomerates, sandstone, limestone, clay, marl, gypsum, and salt.

Mineral products.

The mineral productions of the peninsula are various and rich, and its mines of lead, mercury, tin, iron, silver, copper, salt, and gold (the latter in Portugal, and now of little worth) have been worked from the earliest times. Iron-ore is very generally diffused, but from want of enterprise and capital the total production of iron is less than 50,000 tons a year. Plumbago, antimony, and rock-salt, quicksilver, and coal-mines are found in various provinces, beautiful marbles abound, and quarries of limestone, gypsum, slate, freestone, mill-stone, and black agate, with vast beds of potters' and porcelain clay, and common salt, exist.

Agricultural products.

Spain is reckoned among the most fruitful countries of Europe. Wheat, maize, barley, hemp, and flax are extensively cultivated, especially in the eastern provinces; saffron and other dye-plants are chiefly found in the interior. Mulberry-trees are largely cultivated for rearing silk-worms in Valencia, Murcia, and Grenada; in the south there is an immense variety of the finer fruits, including the almond, date, fig, orange, citron, pomegranate, pine-apple, and banana; and the culture of the vine is universal, though only the coast districts of Xeres, Rota, and Malaga, in Andalusia, and of Benicarlo and Alicante, in Valencia, furnish any considerable quantity of wine for exportation. Large forests of evergreen oaks and cork-trees are still found in Asturias, the Pyrenees, the Sierra Morena, and the Sierra Nevada; but, on the whole, Spain has less timber than any other of the large countries of Europe.

Portugal is more fortunate in this respect, and among the trees and shrubs are the cork tree and kermes oak, the bay tree, Portugal laurel, Spanish chestnut, carob tree, myrtle, pomegranate, rosemary, lavender, licorice tree, and, in the south, various species of palm, the dragon tree, the coral tree, the oleander, and the American agave. The orange, the fig, sugar-cane, and rice grow luxuriantly, and the wheat, grapes, and olives of Portugal are unsurpassed.

Animals.

The wild animals of Spain, wolves, lynxes, foxes, and wild boars are still to be found on the high mountains, and a few bears in the Pyrenees; the quadrupeds, birds, reptiles, and insects are mostly of the same kind as those of southern France. Among the domestic animals, the horse is especially noteworthy. Descended from breeds which the Moors introduced, the Spanish horse has preserved the fire, docility, grace, and vigor of the Arabian. Those of Seville, Granada, and Estramadura are most valued, and yet in recent times they have declined in reputation. Asses and mules are of a superior kind; the asses rival those of Egypt, although mules are preferred for transportation. The bulls, which are often used for the national amusement of bull-fighting, are found wild in the Sierra Morena. Sheep are everywhere extensively raised, a considerable portion belonging to the merino breed. Hogs are bred in vast numbers in Estramadura, Galicia, and Asturias, and are celebrated for the delicacy of their flesh. There are extensive fisheries on the coasts, but the fish of the ocean are preferred to those of the Mediterranean.

Among the wild animals of Portugal, wolves, wild cats, wild goats, wild boars, and deer are the principal, though none of these are numerous. Venomous serpents abound in the mountains, but are rare in the plains and valleys. There are few birds, the most common being the partridge, and, in the mountains, vultures and eagles. The coast and the rivers swarm with fish, but the fisheries are carried on so imperfectly that quantities of salted fish are imported.

Climate.

The climate of the peninsula is divided into several zones, differing greatly from one another. The northern zone extends to the Ebro and the Miño, taking in the high northern provinces. The mountains which cover this zone, the glaciers and the perpetual snows of the Pyrenees, together with the N. and NE. winds, lower the temperature, increase the number and supply of the waters, and promote vegetation. Agriculture is therefore the principal occupation of the inhabitants, especially of the Basques and Catalonians. The winters in this zone are generally cold and the springs moist, but the climate is, on the whole, temperate.

The middle zone, extending as far south as Estramadura, is composed chiefly of vast and elevated plateaus, whose uniform and monotonous surface is swept by the winds and burned by the rays of the sun. Although high mountain-ridges line and traverse this section it has few rivers, and their water is not sufficient to fertilize it. The temperature is subject to extremes; the difference between day and night or between consecutive days is very trying; the winters are cold and the summers burning; but the spring and autumn are pleasant.

The southern zone, comprising Murcia, Andalusia, southern Valencia, and Alemtejo, is exposed to the influence of the burning winds blowing from the deserts of Africa and to the reflection of the rays of the sun on the naked and rocky mountain-walls. The valleys in this zone are deeper and the plateaus less extended and better supplied with water than in the middle zone; the soil is more diversified and better adapted for agriculture. The temperature, delicious in autumn and in spring, is tropical in summer and more rainy than cold in winter.

The Gallego, a N. and NW. wind blowing from Galicia, is very troublesome, and causes painful affections of the eye that frequently result in partial or total blindness.

In Portugal, as well as in the garden belts of country already described, the climate is not subject to the violent extremes of temperature constant farther inland.

Population.

In 1857 the population of the entire peninsula was 19,023,409, of which number 15,454,514 represented the population of Spain, and 3,568,895 that of Portugal. The increase has been gradual since 1700, but latterly in a somewhat more rapid progression.

It is believed that in ancient times Spain was much more densely populated, the number of inhabitants while under the dominion of the Romans amounting, according to some calculations, to 40,000,000; and in the 14th century it still amounted to 24,000,000.

Spaniards.

The immense majority of the population of Spain belong to the Spanish race, which has been formed from a mixture of the descendants of the old Iberians and Celts with the Carthaginians, Romans, Vandals, Suevi, Goths, and Arabians, with a general predominance of the Roman element, although the several provinces show in some respects marked differences in the national character. From the Romans the Spaniard has in particular inherited his pride, his austerity, and his perseverance, while his passionateness gives evidence of Moorish descent, and many of the civil institutions testify to the influence of the Teutonic element.

The men are generally tall and thin, their limbs well-proportioned, hair black, eyes full of fire, features sharp, and gestures measured and solemn; their complexion is dark but clear. The women are well-formed and generally distinguished for noble carriage. They are mostly intelligent and full of feeling.

Basques.

Besides the Spaniards proper, there are three other races, the Basques, the Modejars, and the Gypsies. The Basques, probably the descendants of the ancient Iberians, numbering about 500,000, and forming the majority of the population in the Basque provinces and Navarre, have retained their ancient manners, language, and customs.

Modejars.

The Modejars, about 60,000 in number, are the descendants of the Moors. They are chiefly found in Grenada and Castile, and many of them still preserve the customs of their forefathers.

Gypsies.

The Gypsies or Gitanos, numbering about 50,000, and scattered throughout Spain, speak a peculiar dialect, current only among themselves.

Portuguese.

The Portuguese are a handsome race, with regular features, olive complexions, and dark, expressive eyes. The reputation of the higher orders among their neighbors the Spaniards is not very high, and the latter have an expressive proverb, "Strip a Spaniard of his virtues and you have a Portuguese;" but unprejudiced observers describe the peasantry as possessed of many noble traits of character, though grievously burdened by oppression and misrule.

Spanish possessions.

Inclusive of its territory outside of Europe, Spain is inferior only to the aggregate possessions of England, France, Russia, and Turkey. Its colonial possessions are as follows: Balearic and Canary islands, which are included by the Spaniards in their European possessions; Cuba, Porto Rico, Virgin islands, and St. Domingo, in America; the Philippine islands, in Asia; the Presidios (N. coast of Morocco) and Guinea islands, in Africa; and part of the Ladrone islands, in Oceanica; containing an area of about 115,000 square miles, with a population of nearly 5,000,000.

Portuguese possessions.

The colonies of Portugal are the Azores, Madeira, and Porto Santo, (though administratively those islands are ranked as component parts of the kingdom,) the islands of Cape Verd, Principe, St. Thomas, and Anno Bom, on the African coast; some portions of Guinea, Angola, and Benguela; Mozambique and its territory; Goa, Damas, and Din, in Hindostan; the islands of Timor and Solor; and the city of Macao, in China, with a population of about 2,755,000.

Language and literature.

The modern Spanish contains but few words that can be traced to an Iberian, Cantabrian, or Celtic source. It sprung, like the other Romanic languages, from the vulgar Latin, which seems at an early period to have driven out altogether the primitive languages. As in its sister languages of the Romanic family, the basis has remained thoroughly Latin, though with many modifications, while the influence of the Teutonic is apparent in the formative part of the language. Thus, the vowels e and o of the accented penultima have very frequently developed themselves into the diphthongs ie and ue. Harsh consonants show a tendency to soften and combinations to change themselves into single consonants; l is frequently changed into the beautiful Spanish sound ll, and in words beginning with s followed by another consonant, e has been invariably prefixed. Ni, ne, nn, and gn have been often changed into the liquid ñ, and the other changes, more or less frequent, are noticeable. About one-tenth of the words are of Teutonic origin, and from the Arabs the Spanish received that oriental character which distinguishes it among the Romanic languages. Among the numerous dialects simultaneously developed from the amalgamation of the Latin and the Gothic languages the Castilian gradually gained the ascendency, and has become established as the language of Spain.

The literary life of Spain commenced under the rule of the Romans, when Spain became a chief seat of Roman civilization and produced many of the greatest writers of Latin literature. The national literature begins in the twelfth century with epic and didactic poems. In the fourteenth century a more popular literature began, consisting of ballads, chronicles, romances of chivalry, and the drama. In the sixteenth century, when, under Charles I, Spain suddenly became the most powerful empire of the world, the political glory reflected itself in the rapid progress of literature. The fourth period, beginning with the accession of the Bourbon family, 1701, embraces the collapse of the old national literature, the intrusion of foreign elements, their temporary victory over the old Spanish, and the final attempt to regenerate the old native element and to fuse it with the best elements of modern European civilization; and now Spanish literature is rapidly rising in importance, and it will probably soon occupy again a prominent place among the literature of Europe.

Portugal.

At an early period the language of Lusitani gave place to the Latin, which was spoken in Portugal in comparative purity for about six centuries. The northern barbarians then infused into it a Gothic element, and the compound thus formed was still further corrupted three centuries later by a Semitic admixture. During the Moorish rule Arabic was the language generally spoken by the higher classes, and the influence of this latter was succeeded, though the effect was not destroyed, by that of the idioms of the different foreign auxiliaries, French and others, who assisted the Portuguese in driving out the Moors. The Portuguese is thus one of the modern forms of the Romance language. It bears a remarkable affinity to the Galician, being readily understood by the Gallegos, and a less marked similitude to the Catalan. The pronounciation, though difficult to foreigners, is free from the guttural sounds which abound in Spanish, and while less sonorous than the Spanish and less majestic, it is more fluent, sweet, and simple. Sismondi called it "a boneless Castilian," and the Spaniards have termed it a "language of flowers."

Portuguese literature comprises few works of any note, except poems and histories. Commencing about the beginning of the twelfth century with imitations of the French troubadours, poetic art improved during the thirteenth and fourteenth centuries, and in the fifteenth, which has been called the heroic age of Portugal, prose compositions became numerous and important. The fifteenth and sixteenth centuries showed considerable improvement and were marked by the writings of the best historians; the seventeenth, though producing some writers of note, showed no improvement in style, this being chiefly conspicuous for strained conceits and extravagant phraseology, and of late years Portuguese literature has taken neither a very prominent nor very creditable position.

Coast-line.

The coast line of the Iberian peninsula is about 1,870 miles in length, 500 miles belonging to Portugal, 600 to the coasts of Spain along the bay of Biscay and the Atlantic, and 770 to the Mediterranean.

The north coast from the French frontier to cape Ortegal, and thence to the mouth of the Miño, is rocky, the height ranging from 40 to 300 feet; thence to the mouth of the Guadalquivir the shore is generally low and marshy or sandy, though at some points in Portugal it rises to cliffs of considerable height; from the mouth of the Guadalquivir it rises gradually, and in the bay of Algesiras presents suddenly the magnificent rock of Gibraltar. From Gibraltar to cape Palos it is mostly rocky, but of little elevation, and the E. coast from cape Palos to the French frontier is alternately high and low; a part of it is lined with lagoons, along which numerous salt-works are established.

Bays and harbors.

The indentations of the coast are not remarkable, the only large bays being those of Cadiz, Almeira, and Gibraltar, on the south, and the bay of Rosas and the gulf of Ampolla on the east.

A number of excellent harbors are found in the NW. and W., among which those of Ferrol and Vigo are conspicuous. The port of Oporto, the land-locked port of Lisbon, where the largest vessels may lie within a stone's throw of the city, and the almost unassailable harbor of Cadiz, are the most important W. of the strait, while in the NE. are the harbors of Rosas and Barcelona.

Rivers.

The rivers of the peninsula number more than 230, though but few are navigable. Being bounded on the N. and S. by mountain ranges, their general direction is E. or W.; those flowing W. being much longer than the others. The principal rivers that water the basins inclining toward the Mediterranean are the Ebro, Guadalaviar, Jucar, and Segura, each of which receives several affluents. Five large rivers run westward into the Atlantic, the Miño, Douro, Tagus, Guadiana, and Guadalquivir, the most important of which in point of navigation, is the Guadalquivir, the others being encumbered with rocks, shallows, and falls.

Lakes.

The lakes are not of great importance; the most remarkable being that of Albufeira, south of Valencia, beside which only the lake of Gallocante, in Aragon, and the lagoons of Palomeres and Caldera deserve mention.

Railroads.

The first railroad in Spain was built in 1848, between Barcelona and Mataro, a distance of 15½ miles. In 1861 there were several lines in Portugal and 12 lines in Spain, the latter having a total length of 713 miles. At the present time old lines have been extended and new ones built, so that all the chief cities are connected with the sea-ports, and, generally, with the French frontier. Thus from Lisbon there is one line to Setubal, Evora, Beja, and Faro, one to Coimbra. Aveiro, and Oporto, and one to Merida, Crudad Real, Toledo, and Madrid. From Toledo there is a line to Albacete and Alicante, and from Madrid a rail route may be selected to almost any point. The sea-ports of the Mediterranean coast are almost all connected now by rail.

In any country the stride from road to rail is necessarily great, but on the peninsula it is immense. The railway system, though not making a very splendid show, compared with those of England, France, Germany, or Belgium, is extensive, considering the disadvantages under which it labors, and has made remarkable progress during the last 4 or 5 years. Indeed, of all the towns of the first importance, Granada is now the only one which has not an unbroken railway communication with Madrid and with Europe.

It is notorious that, so far, Spanish railways are failures commercially. They are starved for want of feeders, which alone would be enough to explain the fact that they do not pay; but to this must be added other considerations, such as the unsettled state of the country, the want of confidence, the slackness of business, the very novelty of such things as railroads, and the want of preparation for them; but that they will pay in the end is as little doubtful as that there are in the country the forces to make them pay.

Few of the lines can afford to run more than two trains daily each way, except on short lengths, such as between Madrid and Aranjuez, Valencia, and Jativa, &c. The trains are, however, in general, tolerably regular; the pace reasonably good, and the carriages, though sometimes a trifle out of repair, are for the most part quite as comfortable as those on any continental railway.

Canals.

There are several canals, many of them on a magnificent scale, but mostly unfinished and unfit for navigation. The chief ones are the imperial canal, commenced by Charles V, and extending along the right bank of the Ebro, which accommodates vessels of about 10 feet draught, and the canals of Castile, Manzanares, Murcia, Albacete, and Guadarrama.

Manufactures: Spain.

Manufacturing industry in Spain in former centuries was very prosperous. In the middle ages, the wool and silk tissues of Seville, Granada, and Baeza, the cloths of Murcia, and the arms of Toledo, enjoyed a high reputation. The monopoly given to the royal manufactories, onerous taxes, and other causes combined to undermine this prosperity, and in the seventeenth century the manufactures were but a small proportion of what they had been. Of late industry has improved again. Metallurgic industry has been developed in Guipuzcoa, Biscay, Aragon, Catalonia, and Granada. Silk goods are manufactured at Barcelona, Manresa, Tarragona, Toledo, Seville, and Valencia; woolen stuffs at Segovia, Arevalo, Colmenar, and Alcoy; linen in Galicia, and Catalonia; leather at Barcelona, Cordova, Burgos, Toledo, Granada, and Madrid; and glass ware at Barcelona. There are manufactories of fire-arms in the Basque provinces, Catalonia, and Segovia, and cannon founderies at Seville, Liergganes, Trubia, and Barcelona.

But it is one of the peculiarities of Spanish progress that the propelling power is generally foreign. The railroads are in French hands, the mines in English, the literature is worked by the Germans, the hotel department has been taken charge of by the Italians, and many of the manufactories are in the hands of French and English capitalists.

Portugal.

The manufactures of Portugal are not extensive, only the coarsest fabrics being home-made, and all the finest fabrics imported. About 20,000 hands in all are employed. Woolen stuffs are made in Lisbon, Portalegre, Covilhão, and Tondão; cotton stuffs in Lisbon, Oporto, and Thomar; silk in the Algarves; paper in Tojal and Alemquer; gold and silver work, iron and tin wares, in Lisbon, Oporto, and Thomar; small-arms, steam-engines, and foundery work in Lisbon and Oporto; and porcelain and glass ware at Vistalegre.

Wines.

Excellent wines are to be found in a number of provinces in Spain, and constitute, with oil, the chief riches of some of them. The cultivation of vineyards is capable of considerable extension, and is now receiving increased attention.

The wines of Portugal have long been celebrated, the most famous being port. The vineyards whence this is produced are about 15 leagues from the city of Oporto, in the mountainous districts called Alto Douro, and the best wines are kept at home, those exported being heavily brandied to prevent fermentation and preserve the bouquet. When white grapes have been largely used instead of black, elderberries are added as coloring matter. Until the vine disease appeared in 1854, the average yield of this district was about 105,000 pipes, or rather more than 1 pipe to the acre. In 1859 the wine shipped from the Douro amounted to 17,600 pipes, the greater part of it being sent to England.

Exports and imports: Spain.

The principal imports of Spain are sugar, cotton, tissues of wool, cotton, silk, flax and hemp, iron bars, cod-fish, machines, cacao, guano, and coal; and the exports are wines, specie, lead, raisins, olive-oil, flour, cork, soap, wool, brandy, metals other than lead, and salt. The commerce is greatest with France, England ranking second, and the United States seventh in regard to imports, and fifth in regard to exports. Both imports and exports are largely increasing.

Portugal.

The imports of Portugal consist chiefly of the finer kinds of English manufactures, and of coal, tar, pitch, drugs, butter, cheese, and salt fish; while the exports are wine, oil, salt, fruits, wool, and cork bark. About two-thirds of the exports are to Great Britain, and the rest to Brazil, the United States, France, Spain, Russia, Sweden, and Norway.

Principal sea-ports: Spain.

Among the principal sea-ports of Spain are:

ALGECIRAS, province of Cadiz, on the west side of Gibraltar bay, in lat. 36° 08′ N., long. 5° 26′ W. It is constructed of stone, and presents a fair appearance compared with many of the villages in W. Spain. The port is guarded by a battery, has a first-class hospital, and is much frequented. It is supplied with water conveyed by an aqueduct over the Miel. Principal exports, coal, charcoal, and leather. Population 11,000.

ALICANTE, the principal port of Valencia and the capital of the province of the same name, on the E. coast of Spain, in lat. 38° 22′ N., long. 0° 25′ W. The commerce was formerly extensive, but was much reduced by the prohibitive duties of the last tariff. Chief exports, almonds, olive-oil, and barilla. Population 21,000.

Almeria, the capital of the province of the same name, one of the richest in mineral wealth, on the SE. coast, in lat. 36° 51′ N., long. 2° 33′ W. A walled town, the see of a bishop. Its commerce is much reduced of late years. Population 17,800.

Barcelona, the capital of Catalonia, on the E. coast, 315 miles ENE. of Madrid, situated in a fruitful plain between the rivers Besos and Llobregat. It is a great manufacturing and commercial emporium, and one of the finest cities in the peninsula. The fortifications are important. The harbor is formed by an immense mole running to a considerable distance in a southerly direction, with a lighthouse at its extremity. The manufactures are of silk, leather, lace, wool, and cotton, but none are of much present importance. The imports chiefly from South America, Cuba, and Porto Rico, are cotton, sugar, hides, cocoa, cinnamon, dye-woods, indigo, coffee, horns, staves, &c., with fish from Sweden and Denmark. Exports are wrought silk, soap, fire-arms, hats, lace, ribbons, and steel. Population about 130,000.

Cadiz, on the SW. coast, lat. 36° 32′ N., long. 6° 15′ W. This is the principal station of the Spanish naval force. The white wines of Xeres form by far the principal article of export, the other articles being quicksilver, brandy, oranges, and other fruits, oil, provisions, flour, salt, wool, &c. Imports are sugar and coffee from Havana and Porto Rico, cocoa, hemp, flax, linens, dried fish, hides, cotton-wool, and cotton manufactures, coal and iron, rice, spices, indigo, staves, timber, &c. (See page 219.)

Cartagena, the capital of the province of Murcia, on the SE. coast, in lat. 37° 36′ N., long. 0° 56′ W., is at the head of a deep harbor, well sheltered, flanked by high hills, defended by works at its mouth, and forming one of the best ports in the Mediterranean. In the town there are hospitals, an observatory, an artillery park, a splendid arsenal, barracks, dock-yards, founderies, rope-walks, and a glass-factory. Notwithstanding its commodious port, the town has little commerce. The inhabitants are chiefly engaged in lead and silver mining, fishing, and exporting barilla, grain, and esparto, (Spanish grass hemp.) Population about 34,000.

CORUÑA, on the NW. coast in lat. 43° 22′ N., long. 8° 23′ W., is at the head of a deep, spacious, and safe harbor. The chief branches of industry are ship-building, fishing, the salting of provisions, and the manufacture of glass, soap, starch, cotton, cigars, iron, oil-cloth, and hats. The famous Spanish armada was refitted in the bay of Coruña, in June, 1588, prior to setting sail for England. (See page 44.)

FERROL, on the N. arm of the bay of Betanzos, about 12 miles NE. of Coruña, has one of the best harbors in Europe. It has an immense marine arsenal, covering nearly 24 acres, with a magnificent basin and docks. Ferrol has a few manufactures, but being a military port foreign merchant-vessels are excluded from it. (See page 36.)

GIBRALTAR, lat. 36° 3′ N., long. 5° 15′ W., is on the bay of Gibraltar, on the S. coast, and belongs to Great Britain. The natural advantages of position, and the fortifications, have made this place literally impregnable. The trade has declined since the beginning of the nineteenth century. The exports to Great Britain consist chiefly of wool, tobacco, wine, silk, and senna, and the imports of wine, spirits, tobacco, spices, tea, and cotton. Population about 16,000.

HUELVA, about 50 miles WSW. of Seville, at the junction of the Odial and Tinto rivers, a few miles from the sea. It has some tunny fishing, and carries on a considerable trade in fruit and floor mattings. (See page 201.)

MALAGA, in the province of Granada, on the S. coast, in lat. 36° 43′ N., long. 4° 25′ W. It has an excellent harbor, protected on its eastern side by a mole 700 yards in length. Owing to the want of official returns and the prevalence of smuggling, it is not possible to obtain any accurate accounts of the trade of Malaga or any other Spanish port. The great articles of export are wine and fruits, particularly grapes, almonds, and raisins, figs and lemons ; there is also a considerable exportation of olive-oil, with quantities of brandy, anchovies, cummin-seed, anise-seed, barilla, esparto, soap, &c. The lead exported from Malaga is brought from Ada. The imports consist principally of cotton-stuffs, iron, and hardware, machinery, with coals, &c., from England, with salt fish, dye-stuffs, and all sorts of colonial produce; linens; raw cotton from the United States; butter and cheese from Holland; timber and naval stores from the Baltic, &c. The Americans import a considerable quantity of Malaga wines. Population, 113,000.

MARBELLA, on the S. coast, 30 miles WSW. from Malaga. This town rose into importance some years ago, upon the discovery of iron in the Sierra Blanca; it is smelted here and sent on to Malaga to be refined. The commerce consists in the importation of oil, wheat, and barley, and in the exportation of sardines and other fish, figs, raisins, and wine, which, though in no great quantity, is of excellent quality.

SAN SEBASTIAN, on the N. coast, the capital of one of the Basque provinces. The harbor is small and not easily accessible, but it is well protected. The manufactures of the place are insignificant. There is a considerable trade in English and French goods, corn and other articles being exported. Population, 10,000.

SANTANDER, on the N. side of a large open harbor on the N. coast of the province of the same name. The harbor is large, deep, and safe, affording good anchorage, and easy of access. There is a cigar-manufactory here, with breweries, tanneries, sugar-houses, candle-factories, cooperages, &c. A considerable trade is carried on, chiefly with Cuba, whence sugar, coffee, and rum are imported, and to which flour is exported. Cocoa is brought from La Guayra, and fish from Norway, Shetland, and Newfoundland, in exchange for timber, hides, oil, and rice. Population, 20,000.

SEVILLE, the third city in Spain in size, on the Guadalquivir, was of great commercial importance, but the difficulty of taking large vessels up the river has caused it to be supplanted by Cadiz. The manufactured articles are of very inferior quality. Exports are wool, leather, silk, oil, oranges, quicksilver, lead, and copper; and the imports are iron, steel, hardware, timber, cloth, cheese, butter, &c. (See page 212.)

TARRAGONA, capital of a province of the same name in Catalonia, 45 miles WSW. of Barcelona. A considerable coasting trade is carried on, but the harbor only admits small vessels. Population, 13,000.

TARIFA, at the extreme S. point of the peninsula. Leather, vermicelli, earthenware, and other articles are manufactured here. Fishing is extensively carried on, and there is a considerable coasting trade, but the harbor does not admit large vessels. Population 8,000.

Valencia, the capital of the province of the same name, on the S. bank of the Guadalaviar or Turia, 3 miles above its mouth. The principal manufacture is silk, but linen and woolen cloth, hats, leather, paper, and glass, are also made here. It has some commerce, but this is much impeded by the want of a good harbor, there being only a small roadstead in the river at El Grao, and another outside, which is very much exposed. The exports are corn, rice, silk, saffron, oranges, and almonds; and the imports, iron, hardware, timber, linen, and colonial produce. Population about 107,000.

Vigo, in the province of Pontevedra, on the NW. coast. It has a good harbor, an active fishery, and an extensive export trade in wine, corn, and bacon. (See page 113.)

Portugal. There are not many good harbors along the coast of Portugal, the seaports being only—

Aveiro, in the province of Beira, lat. 40° 40′ N., long. 8° 34′ W. It has a thriving trade in oil, fish, salt, wine, and oranges. (See page 147.)

Figueira, in the province of Beira, on the N. bank of the estuary of the Mondego, and 24 miles from Coimbra, of which it is the port. It is a favorite bathing-place, and has an extensive export trade in salt, wine, oil and fruits. The harbor is difficult of access for large vessels. (See page 152.)

Lisbon, the capital of Portugal, on the N. bank of the Tagus. Though one of the best situated commercial cities of Europe, the commerce of Lisbon cannot be very extensive, as the country it supplies is but small and in a very backward state of improvement, though the recent rail connections have added somewhat to its importance. Among the exports are wines, liquors, oak-bark, vinegar, gold and silver, and argol; and the imports, animals, animal products, fish, woolens and furs, silks, cotton, linen, timber, farinaceous substances, colonial goods, vegetable substances, metals, minerals, liquids, glass, paper, chemicals, &c. (See page 167.)

Setubal, in the province of Estramadura, 18 miles SE. from Lisbon. The quays are broad and the harbor extensive, but its entrance is much incumbered by sand-banks. The well known St. Ubes salt of commerce is made here, and the other exports are wine, grain, and fruit, which are largely produced in the vicinity. (See page 178.)

OPORTO, on the N. bank of the Douro, about 2 miles from its mouth, in lat. 41° 10′ N., long. 8° 37′ W. The harbor can only be entered by vessels of considerable draught at high water on account of the bar. Oporto is the emporium of a large portion of the kingdom, and enjoys a tolerably extensive foreign commerce. Port wine is the largest article of export, the others being oil, oranges and other fruits, wool, refined sugar, cream of tartar, sumac, leather, cork, &c. The imports are corn, rice, beef, salt fish, and other articles of provision; sugar, coffee, &c., from Brazil; cotton and woolen goods, hardware, tin plates, &c., from England; hemp, flax, and deals from the Baltic, &c. (See page 138.)

VIANNA, at the mouth of the Lima, 40 miles N. of Oporto. The harbor is small, but a considerable fishery and coasting-trade is carried on. (See page 130.)

Port dues, &c.

As the port dues and other charges vary greatly in the different ports, those given below for Cadiz and Lisbon are only to give some idea of the amounts demanded.

The port and other charges at Cadiz were fixed January 3, 1852, as follows: The ships of all the nations which concede an equal benefit in their respective territories to the vessels of the Spanish marine, to be put on an equality in the peninsula and adjacent islands with Spanish vessels for the exaction of navigation and port-dues, *i. e.*, of light-houses, anchorage, and loading and unloading, established in the law of April 11, 1849, and in the royal decree of December 16, 1851.

Shipping charges, &c., at Cadiz, are heavy.

Pilotage, (ordinary for every vessel)	$9 50
Pilotage to Trocadero about	21 00
Pilotage to Carraca about	20 00
Every change of anchorage	3 25
To pilot for the hire of his boat, from	1 00 to 5 00
Puntales fort dues, (every vessel passing)	75 reals.
Captain of port, according to tonnage and rig	4 to 8 reals.
Light-house dues, per Spanish ton	1 real.
Anchorage dues, per Spanish ton	1 real.

If quarantined, a vessel pays 25 reals per Spanish ton, daily; and it is well to remember that *all* vessels arriving with a bill of health *not* countersigned by a Spanish consul or authority, are quarantined, generally for 3 or 4 days.

There is also a small tax on vessels leaving, called "consumos dues," which is levied according to crew and passengers.

A most important branch of the import trade of Spain is the smuggling, which is now managed in the custom-houses as well as by the contrabandistas. This is said to be an understood matter, and in the south of Spain, where free-trade doctrines are more prevalent than in Catalonia, it would be impossible to prevent smuggling, except by free-trade.

Port dues: Lisbon.

The port regulations of Lisbon are as follows: All vessels coming over the bar are to heave to at the Paço d'Arcos, that they may be registered and receive on board a customs officer. Masters of vessels must bring with them two manifests of the cargo, containing shippers' and receivers' names, marks, number and contents of packages, legalized by the Portuguese consul at the port of departure. They will otherwise be fined double the amount of duties. The bill of health must contain the number and names of passengers, and be also legalized by the Portuguese consul. Passengers must be provided with passports; masters of vessels are otherwise liable to pay a fine.

Vessels loading, unloading, or merely remaining in port, (in *franquia*,) which they are permitted to do for 6 days, (or for 10 days if sufficient grounds be assigned for the indulgence,) must anchor and continue in the situation pointed out by the authorities; and as any infringement of the customs or port regulations is followed by heavy fines, and is often the cause of much delay, they should be carefully attended to.

All masters of vessels, seamen, and passengers, are obliged to deliver up to the authorities who come on board all soap and tobacco they may possess, being only allowed to retain what may be deemed sufficient for their own use on board. Any tobacco or soap found in their possession while going on shore is seized, and the bearer subjected to imprisonment and very heavy fines; the tobacco taken from the parties on arrival is restored to them on leaving.

Port charges consist of pilotage and tonnage dues.

Pilotage inward for vessels of 3 masts	$9 00
Pilotage inward for vessels of 1 and 2 masts	7 00
Pilotage outward for vessels of 3 masts	8 00
Pilotage outward for vessels of 1 and 2 masts	6 00

Tonnage dues are rather complicated. Vessels coming in with a full cargo and leaving in ballast, coming in and leaving in ballast, coming in with cargo and leaving with foreign goods, pay 26 cents per ton; also vessels taking ⅔ of the cargo salt and foreign goods, pay said tonnage dues on the goods.

Vessels arriving loaded and leaving with cargo pay for Portuguese goods, 16 cents; the same vessels taking ⅔ salt and the remainder goods, pay on the Portuguese goods. Vessels coming in and going out with the same cargo pay 7½ cents per ton, also those which come in loaded and leave with a full cargo of salt; and those which take ⅔ of the cargo salt, pay this tonnage duty on the salt. Vessels arriving in ballast and leaving with a full cargo of salt pay no tonnage dues, and vessels putting in in distress. No tonnage dues are paid on grain, oil, or salt, if they form ⅔ of the cargo, the vessel clearing for Lisbon.

Money.

In Spain, accounts are kept in reals and cents. English gold and silver do not pass current. The coins are:

	Dols.		Reals.
Gold Isabella, 100 reals	5	Silver ½-dollar	10
Gold-piece of 80 reals	4	Silver peseta	5
Gold-piece of 40 reals	2	Silver peseta	4
Gold-piece of 20 reals	1	Silver ½-peseta	2
Silver dollar, 20 reals	1	Silver coin of	1

There are sometimes also doubloons and half-doubloons in circulation, and French five-franc pieces of silver, which pass currently for 19 reals, called always in Cadiz, Napoleons.

In Portugal, gold is the circulating medium, silver being legal tender only to the extent of 5¼ dollars in any payment. The gold in circulation is almost all British coin, sovereigns and half-sovereigns, having respectively a legal value of 4,500 and 2,250 reis. There are pieces of 8,000 and 4,000 reis, Portuguese coin, in circulation and a few pieces of 5,000, 2,500, and 1,000 reis. The old silver coins of 480, 240, 120, and 60 reis are being withdrawn; the new coins being 500, 200, 100, and 50 reis. The copper coins are 40, 20, 10, and 5 reis pieces. The mil reis (1,000 reis) is thus a little more than a dollar. 1,000,000 reis is called a conto. In a notation of accounts the mil reis are separated from the reis by the dollar sign; thus a sovereign, 4,500 reis, is written 4$500.

Naval force.

The present unhappy condition of Spain, both at home and in her colonies, has caused many changes in the navy, and has demonstrated that it is by no means so strong as was supposed. In 1861 the force of the navy was stated to be 46 sailing-vessels, 65 screw-steamers, and 25 paddle-wheel steamers, besides 111 vessels armed for coast-defense, with more than 1,000 guns, 1,325 officers, and about 21,000 men.

On the 12th of December, 1873, a list of the vessels of the Spanish navy was submitted to the United States House of Representatives. It numbered 11 iron-clads, 11 screw-frigates, 27 screw-vessels of 2 to 6 guns, 22 side-wheel steamers, 7 screw-transports, unarmed, and 51 screw gunboats, carrying 1 gun each. The whole number of armed vessels carry 821 guns, but of these vessels, 3 of the iron-clad frigates are building, and 3 of the screw-frigates and 6 side-wheel steamers are unseaworthy, while 1 iron-clad and 1 side-wheel frigate have been lost during the present disturbances. The plating of the iron-clads now in service does not exceed 5½ inches in thickness.

The Portuguese navy in 1867 was composed of 33 ships, of 18,562 tons, manned by 3,180 men, and carrying 315 guns. In 1864 the merchant-marine numbered 582 vessels, of 91,962 tons, 13 of these being steamers, and 400 being engaged in foreign trade. The number of sailors and enlisted boys was, at that time, 20,792. In 1865, 17,197 sailing-vessels and 1,835 steamers entered in and cleared from the different ports of the kingdom.

NOTE.—Extension of commercial privileges in Spain.

An order of the Spanish provisional government is published in the *London Gazette*, March 23, 1869, extending to the ships of every nation the power hitherto enjoyed by Spanish vessels only, of going to foreign ports with cargoes from foreign America, and with cargoes of dried fish from the same ports, with a consular register under the same rates and formalities as are established by articles 8 and 260 of the customs ordinances, and by a subsequent decree. British vessels coming from British India are entitled to national treatment in respect of the payment of port and navigation dues on the Spanish colonies.

APPENDIX.

REPORTED DANGERS.

Much has been written in regard to dangers supposed to exist off cape St. Vincent, as Dœdalus, Dario, and Ugarte shoals, situated respectively S. 28° W., distant 33 miles from the cape; N. 68° W., distant 28 miles; and S. 78° W., distant 115 miles. A succinct history of these dangers, now generally erased from modern charts, is found in the *Navegacion del Océano Atlantico*, published by the Spanish Hydrographic Office in 1864.

Dœdalus rock.

Captain P. Rindavets y Tudury, of the Spanish Navy, says, (1867:) In regard to Dœdalus rock, the mean of the given positions of which is lat. 36° 32′ 57″ N., long. 9° 19′ 26″ W., I do not believe in its existence, at least not in the assigned positions, as many vessels have passed over these without discovering it, nor could it be found by the Spanish gun-boat *Consuelo*, which left Cadiz in August, 1864, to search for it. Though the weather was not very good, the *Consuelo* was nevertheless able to cross over the supposed position of the shoal several times, but no discolored water was seen, nor was there the least appearance of breakers, although there was a heavy sea running. The state of the sea precluded accurate soundings, but one was obtained four miles E. of the position given on the chart in 283 fathoms. If this danger exists, it is probably much farther to the westward, and in this case it may be identical with those which, under the names of Ugarte and Garcia Guerra, are given doubtful positions in more western longitude, but in nearly the same latitude.

Norie's *Sailing Directions for the Coasts of Spain and Portugal*, 1863, states:

In the year 1813 the *Dœdalus*, transport, struck upon a rock situated about 12 or 15 leagues SW. (magnetic) from the cape, and received so much damage as rendered it necessary for her to put into Lisbon for repairs. Although the existence of this rock has been questioned by some, there is no doubt that it does exist, as several vessels have struck upon it, and some have been lost; but unfortunately its precise situation has not yet been determined.

Mr. John Aves, master of the schooner *Tantivy*, of Plymouth, under date of March 23, 1849, says:

There is a rock off cape St. Vincent named Dœdalus, marked doubtful on the chart, on which I have heard some ships have struck, and that some masters of vessels have seen it, but I believe it is some time since. However, on my passage this time from Zante, on the 6th instant, at 9 h. 30 m. p. m., I went close to the eastward of it—indeed, much closer than I wished, and as we did not see it until close aboard, it was with difficulty avoided. There was a swell from the NW. at the time, breaking over it, and a sheet of foam around, about 20 to 25 fathoms in circumference. The top of the rock might not be large, but no doubt can remain that such a rock is there; and it is much to be regretted that the true position of such a dangerous one has not been ascertained. We stood NNE. on the port tack till 7 next morning, when we tacked to the southward, the cape close on board, distant about two miles. In my opinion the rock is laid much too far to the westward in the chart, and I should say that it bears about SSW. true, distant about 37 or 40 miles from the cape.

Dario rock.

The Dario rock is generally omitted from the modern charts, except the Spanish, where it is placed in lat. 37° 12′ 30″ N., long. 9° 31′ W., the position assigned to it by the master of the Spanish brig *Dario*, who reported seeing it on the 25th of April, 1834. Since that date there is no report of it, notwithstanding its proximity to cape St. Vincent, where so many vessels are constantly passing. The *Consuelo* sought for it in 1864 without success, and its existence is considered very doubtful, at least in the assigned position.

Ugarte shoal.

April 14, 1832, Tomás Ugarte, master of the Spanish lugger *Jóven Enrique*, being by account in lat. 36° 38″ N., long. 11° 21′ 38″ W., about noon, noticed a whitening of the water, and, on examination, could clearly distinguish the bottom, which appeared to be of sand, with occasional black patches. He got several soundings in 3 to 3½ fathoms, and saw the sea breaking about a quarter of a mile to southeastward of him, though there was very little swell. He passed over the shoal on a NW. course, and estimated its extent as about 1 mile from NW. to SE., and a little less from NE. to SW.

Garcia Guerra rock.

At 11 p. m., June 16, 1837, Captain S. Garcia Guerra, of the Spanish brig *Pelicano*, made out an object nearly alongside, and being close to, he saw that it was a whitish rocky head as large as a barrel, uncovering in the trough of the sea, and with a tongue from its SW. side sloping to the S. and showing as white as marble in the moonlight. On this tongue the ship touched, and the rudder hung on it. By an observation of the polar star taken half an hour later, and longitude, by account, (having left Cadiz fifty-three hours before,) he computed the position of the shoal as lat. 36° 36′ 30″ N., long. 10° 51′ 16″ W. Captain Garcia Guerra thought it possible that this was the same shoal reported by Ugarte in 1832.

Regueral shoal.

In the archives of the Spanish Hydrographic office there is an account of a shoal discoved by a pilot named Andrés Regueral, July 11, 1798. When nearing cape St. Vincent, he noticed discolored water; at 1 a. m. he sounded in 95 fathoms of water—bottom of small shells; at 3 a. m. sounded in 64 fathoms water, shells, and at 5 a. m. in 94 fathoms water, white sand and shells. The calculated position of this bank is 103 miles S. 82° W. from cape St. Vincent, in lat. 36° 35′ N.

These various reports lead to the belief that near the parallel of 36° 35′ N., and between the meridians of 9° and 11° 30′ W., there are dangers that do not appear, or only incorrectly, on the charts, though there has been considerable unsuccessful search made for them in and near the given positions. Vigilance should therefore be exercised in the vicinity of cape St. Vincent, and any appearance of a danger carefully investigated.

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